KYOCERA

KYOCERA
COMPACT LASER PRINTER
F-1000 /F-1000A/F-1000+

USER'S MANUAL

KYOCERA

Printed in Japan 5KKTF1000*XC

We shall have no liability or responsibility to customers or any other person or entity with respect to any liability, loss or damage caused or alleged to be caused directly or indirectly by equipment sold or furnished by us, including, but not limited to, any interruption of service, loss of business or anticipatory profits, or consequential damages resulting from the use or operation of the equipment or software.

CAUTION

Do not touch the surface of the drum. Read the accompanying installation instructions carefully.

NO LIABILITY WILL BE ASSUMED FOR ANY DAMAGE CAUSED BY IMPROPER INSTALLATION.

NOTICE

SOFTWARE USED WITH THIS PRINTER MUST SUPPORT THE PRINTER'S EMULATION MODE.

The printer is factory-set to emulate the HP LaserJet series II. The emulation mode can be changed by the program at the end of Section 1.4.

NOTICE

The information in this manual is subject to change without notification. Additional pages may be inserted in future editions. The user is asked to excuse any omissions or errors in the present edition.

No responsibility is assumed if accidents occur while the user is following the instructions in this manual. No responsibility is assumed for defects in the printer's firmware.

The contents of this manual are protected by copyright. No part of this manual may be reproduced or copied by any means without the permission of the copyright holder.

The printer's firwmare (contents of its read-only memory) is similarly protected by copyright.

Regarding trade names:

- Diablo 630 is a product of Xerox Corporation.
- Qume Sprint 11 is a product of Qume Corporation.
- NEC Spinwriter is a product of Nippon Electric Co. Ltd.
- IBM-PC Graphics Printer is a product of International Business Machines Corporation
- Epson FX-80 is a product of Seiko Epson Corporation.
- HP LaserJet series II is a product of Hewlett-Packard Inc.
- Centronics is a trade name of Centronics Data Computer Corp.

©1987—1991 Kyocera Corporation
All rights reserved
Revision 1.5, July 1991

Federal Communications Commission Requirements

This equipment generates and uses radio frequency energy and if not installed and used properly, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of part 15 of the FCC rules, which are designed to provide reasonable protection against such interference in residential installations.

There is no guarantee, however, that interference will not occur in a particular installation.

If this printer does cause interference to radio or television reception, which can be determined by turning the printer off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the printer or computer with respect to the receiver.
- Move the printer or computer away from the receiver.
- Plug the printer into a different outlet so that the printer and receiver are on different branch circuits.
- Connect the printer to the computer with a grounded, shielded interface cable.

If necessary, consult your dealer or an experienced radio/television technician for additional suggestions.

You may find the following booklet prepared by the Federal Communications Commission helpful:

How to Identify and Resolve Radio-TV Interference Problems

This booklet is available from the U.S. Government Printing Office, Washington, D.C., Stock No. 004-000-00345-4.

Warning

This equipment has been certified to comply with the limits for a Class B computer peripheral device, pursuant to Subpart J of Part 15 of FCC Rules. Only computing devices certified to comply with Class B limits may be attached to this equipment. Operation with non-certified equipment is likely to result in interference to radio and TV reception.

Interface Cable

Either of the following interface cables meets the FCC requirements:

Parallel interface: IBM Printer Cable Type 1525612

Serial interface: IBM Communication Adapter Cable Type 1502067 (See Appendix E.)

Safety Information

Laser Safety
This printer is certified as a Class 1 laser product under the U.S. Department of Health and Services (DHHS) Radiation Control for Health and Safety Act of 1968. This means that the printer does not produce hazardous laser radiation. Since radiation emitted inside the printer is completely confined within protective housings and external covers, the laser beam cannot escape from the printer during any phase of user operation.

CDRH Regulations
The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured after August 1, 1976. Compliance is mandatory for products marketed in the United States. A label indicating compliance with the CDRH regulations must be attached to laser products marketed in the United States.

Caution

Use of controls, adjustment or performance of procedures other than those specified in the manual may result in hazardous radiation exposure.

IMPORTANT SAFEGUARDS

1 Read all of these instructions and save these instructions for later use.

2 Unplug this product from the wall outlet before cleaning.

3 Do not use this product near water.

4 Do not place this product on an unstable card, stand, or table. The product may fall, causing serious damage to the product.

5 Slots and openings in the cabinet and the back are provided for ventilation to ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.

6 This product is equipped with a 3-wire grounding type plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.

7 Do not allow anything to rest on the power cord. Do not locate this product where persons will walk on the cord.

8 If an extension cord is used with this product, make sure that the total of the ampere ratings on the products plugged into the extension cord do not exceed the extension cord ampere rating.

9 Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.

10 Except as explained elsewhere in User's Manual, do not attempt to service this product yourself. Removing covers may expose you to dangerous voltage points or other risks. Refer all servicing in those compartments to service personnel.

11 Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

A When the power cord or plug is damaged or frayed.

B If liquid has been spilled into the product.

C If the product has been exposed to rain or water.

D If the product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.

E If the product has been dropped or the cabinet has been damaged.

USER'S MANUAL

CONTENTS

Introduction — 1
Guide to the Laser Printer Manuals — 4

CHAPTER 1 INSTALLING THE LASER PRINTER — 1-1
1.1 Names of Parts — 1-2
1.2 Choosing a Location — 1-9
Basic Requirements — 1-9
Clearance — 1-10
Places to Avoid — 1-11
Note on Power — 1-11
1.3 Unpacking and Inspection — 1-12
1.4 Repacking — 1-14
1.5 Setup and Interfacing — 1-15
1 Open the Upper Unit — 1-16
2 Remove the Fuser Spacers — 1-17
3 Ready the Drum Cartridge — 1-17
4 Install the Drum Cartridge — 1-19
5 Install the Fuser Cleaning Pad and Waste Toner Bottle — 1-20
6 Close the Printer — 1-21
7 Set Paper — 1-22
8 Install the Toner Cartridge — 1-24
9 Attach the Power Cord — 1-27
10 Connect the Printer to the Computer — 1-27
11 Test the Printer — 1-28
12 Test the Interface with the Computer — 1-30
13 Set the Emulation Mode — 1-31
1.6 Prolonged Non-Use — 1-32
1.7 Moving the Printer — 1-33

CHAPTER 2 OPERATING THE LASER PRINTER — 2-1
2.1 Control Panel — 2-2
Layout — 2-2
Indicators and Code Display — 2-3
Control Keys — 2-5
2.2 Operating Procedures — 2-6
Switching Power On — 2-6
Printing — 2-7
Temporary Print Pause — 2-8
Abandoning a Printing Job — 2-9
Status Printout — 2-10
RS-232C Reset Procedure — 2-11
Rereading an IC Card — 2-12
2.3 Page Formatting — 2-13
2.4 Manual Paper Feeding — 2-14
Manual Feeding Procedure — 2-15
Feeding Envelopes — 2-16
2.5 IC Cards — 2-17

CHAPTER 3 MAINTENANCE — 3-1
3.1 Maintenance Schedule — 3-2
3.2 Toner Kit Replacement — 3-5
3.3 Drum Kit Replacement — 3-12
3.4 Developer Kit Replacement — 3-18

CHAPTER 4 TROUBLESHOOTING — 4-1
4.1 General Guide — 4-2
4.2 Power Problems — 4-3
4.3 Interface Problems — 4-4
4.4 Print Quality Problems — 4-5
4.5 Indicators and Codes — 4-12
4.6 Correcting a Paper Jam — 4-14

APPENDIX A HOW THE LASER PRINTER WORKS — A-1

APPENDIX B PRINTER SPECIFICATIONS — B-1

APPENDIX C PAPER SPECIFICATIONS — C-1
C.1 General Guidelines — C-2
C.2 Selecting the Right Paper — C-4
C.3 Special Paper — C-8

APPENDIX D HOST COMPUTER INTERFACE — D-1
D.1 Parallel Interface — D-2
D.2 RS-232C Interface — D-6
D.3 RS-232C Protocols — D-8

APPENDIX E RS-232C CABLE CONNECTION — E-1

APPENDIX F GLOSSARY — F-1

INTRODUCTION

Laser printing is one of the newest and best computer printing technologies. If you are used to a dot matrix printer or daisywheel printer, you are in for a pleasant surprise. You will find that laser printing is faster, quieter, and much more versatile, and you will like the near-typeset print quality and excellent graphics.

The laser printer works very much like a desktop copier, and prints on the same type of plain paper. The difference is that instead of copying a document, it uses a laser beam to write data sent from a computer. The laser beam scans the page the same way the electron gun in a TV picture tube scans the TV screen, at similar high speed, but with much finer resolution: 300 dots/inch (12 dots/mm) in both directions. The result is a whole page of high-quality printing in just six seconds.

The laser printer's combination of advanced electronics, laser optics, and nonimpact printing give it many extremely desirable features. These include:

- High print quality
  With 300 dots per inch, the printout is close to typeset quality.
- High speed
  The printer prints up to ten pages a minute. Normal speed is over 500 pages an hour.
- Compact size
  The laser printer's trim lines are proof that you do not need a large machine to get professional-quality output.
- Quiet operation
  Even during printing, the maximum noise level is an unobtrusive 55 dB.
- Graphics
  Printer commands offer high-resolution vector and raster graphics.

The mechanical excellence of the laser printer is matched by its built-in intelligence. With its own microprocessor and memory, the printer tests itself, controls the optimum print density, and in general looks after itself with a minimum of help. There are no adjustments to make, ribbons, printwheels or cartridges to set, or software to load. As soon as its power is switched on the printer is ready to print in a wide variety of built-in type styles and sizes. And with the printer's easy-to-use PRESCRIBE command language you can create your own new type styles for special effects, print graphics on the same page as text, and print machine-scannable barcodes.

- Five of the laser printer's many built-in fonts

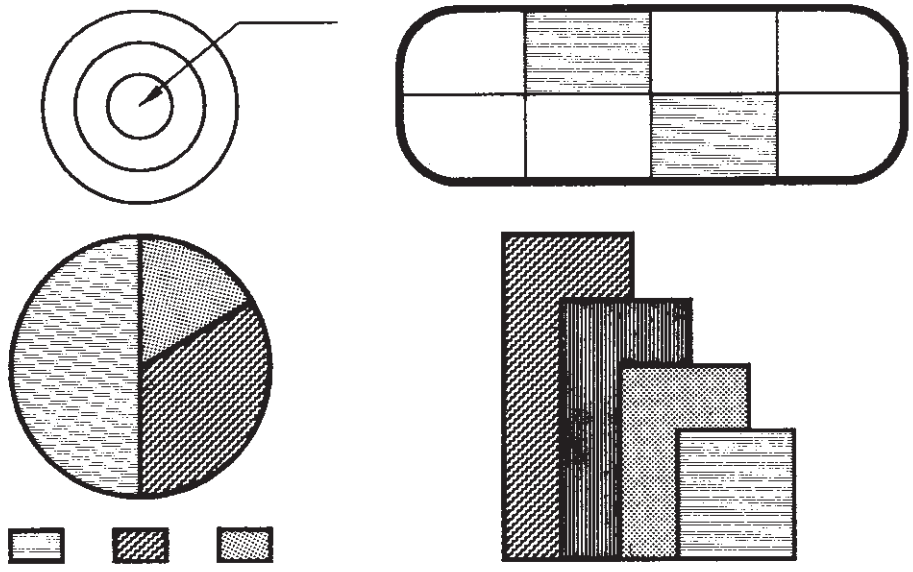
The laser printer's fonts include
fixed fonts like this Let. Gothic Bold font
plus Courier, Pret. Elite, and Line Printer
offering a useful selection of styles, sizes, and orientations.
Also provided are proportional fonts suitable for desktop publishing such as the Dutch 801 and Swiss 721 fonts.

- Special effects created with DYNAMIC fonts

PRINT EYE-CATCHING TITLES!

UnlImited VARIATIONS

- PRESCRIBE graphics



- UPC barcode with human-readable text

Perhaps the greatest advantage of the laser printer's intelligence is that it emulates other printers. If you have software for the IBM-PC Graphics Printer, Diablo 630, Qume Sprint 11, NEC Spinwriter, Epson FX-80, or HP LaserJet series II you can use it with the laser printer. All you need to do is set the laser printer to the matching emulation mode.

GUIDE TO THE LASER PRINTER MANUALS

Three manuals are supplied with the laser printer:

User's Manual (this manual)

The main topics covered in this manual are:

- Installation
- Control panel operations
- Maintenance and troubleshooting

The User's Manual guides you through the installation procedure and explains the basic printing operations. It contains all the information you need to use the printer with word-processing and graphics software.

Programming Manual

The main topics covered in this manual are:

- PRESCRIBE command language
- Emulation features

The Programming Manual explains how to place PRESCRIBE commands in document files for formatting, to change type styles "on the fly," to add graphic designs, etc. Read this manual when you want to go beyond the capabilities of software designed for other printers.

Quick Reference

The Quick Reference is a convenient summary of the control panel, resident fonts, and PRESCRIBE command language.

CHAPTER 1

INSTALLING THE LASER PRINTER

This chapter explains how to unpack and install the laser printer. The topics covered are:

- Names and functions of parts
- Choosing a location
- Unpacking and inspection
- Setup and interfacing

1.1 Names of Parts

This section takes you on a guided tour of the laser printer, pointing out its major parts and giving a brief description of the function of each. The tour starts with the main outer parts and concludes with what you will see when you open the printer up for maintenance. The part names introduced in this section will be used throughout this manual.

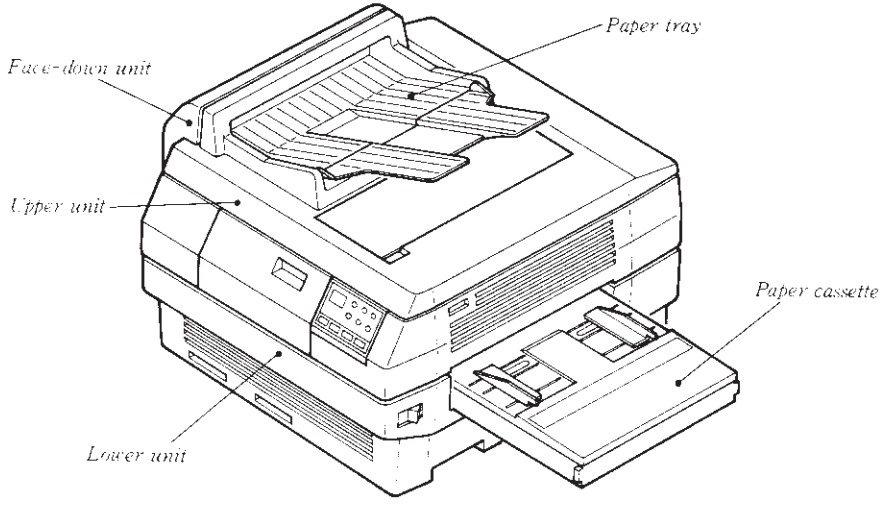


Figure 1.1 Main Parts

Upper unit: contains the laser, photosensitive drum, and developer unit.
Lower unit: contains the paper transport and the printer's main logic board.
Paper cassette: holds paper for automatic feeding.
Face-down unit: delivers the printed pages face-down, so that they stack in the right order.
Paper tray: receives the printed pages face-down, so they stack in the correct order.

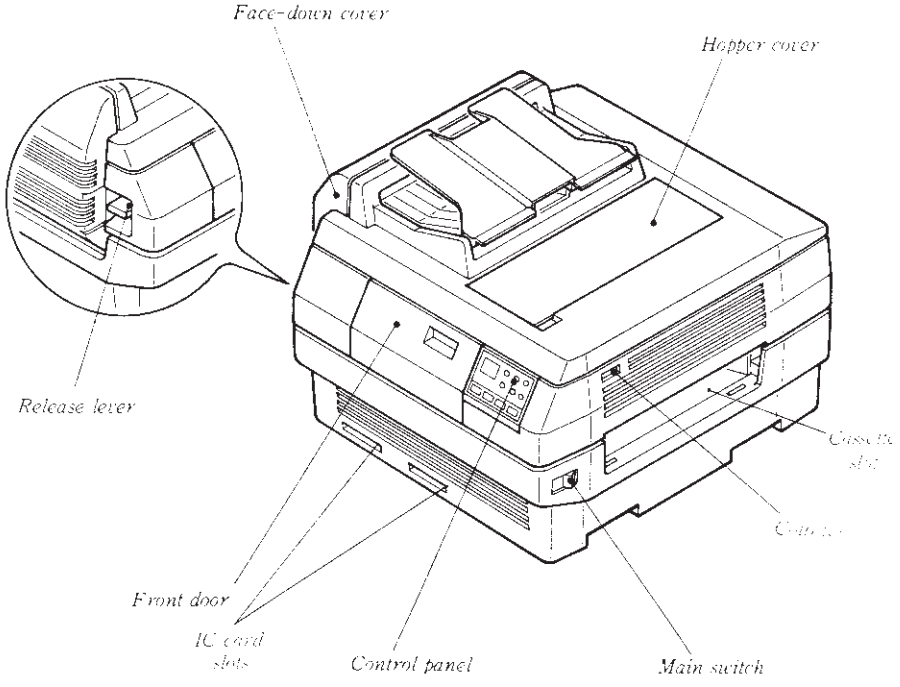


Figure 1.2 Doors, Slots, and Controls

Main switch: turns the printer's power on and off.
Counter: counts the number of pages printed.
Control panel: contains the printer's other switches and indicators.
Release lever: opens the main unit.
Front door: provides access to the drum cartridge, for replacement and cleaning.
IC card slots: for inserting IC cards to obtain additional fonts etc.
Face-down unit cover: provides access to the face-down unit, for correcting paper jams.
Hopper cover: provides access to the toner cartridge and developer unit, for replacement.
Cassette slot: for the paper cassette.

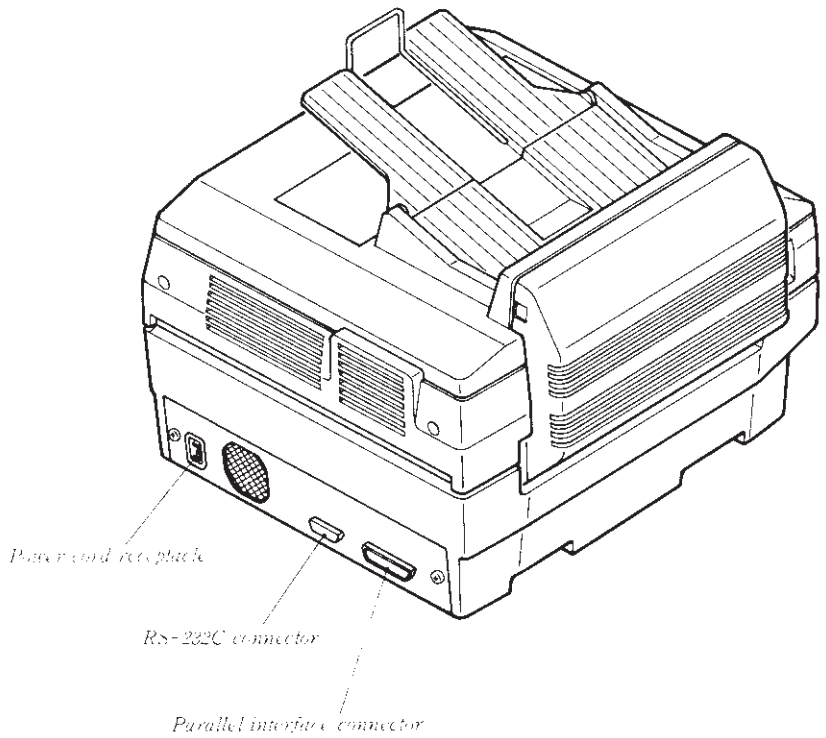


Figure 1.3 Rear Panel

Power cord receptacle: for the power cord.
Parallel interface connector and **RS-232C connector:** for connecting the printer to the computer. (Use one connector or the other.)

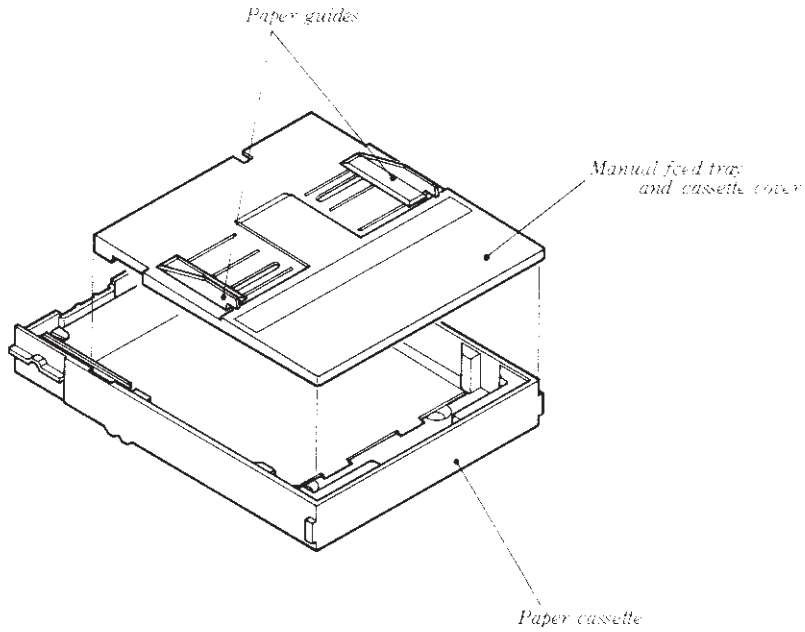


Figure 1.4 Paper Cassette

Manual feed tray: used to feed paper of any size (envelopes for example) by hand. Doubles as the cassette cover. Must be removed when adding paper to the cassette.
Paper guides: adjust to the size of manually fed paper, to center the paper; not necessary when cassette paper is used.
Paper cassette: holds standard-size paper for automatic feeding. The printer comes with one A4 or letter-size cassette. Cassettes of other sizes can be ordered as options. Cassettes are available in letter, legal, A4, and B5 sizes.

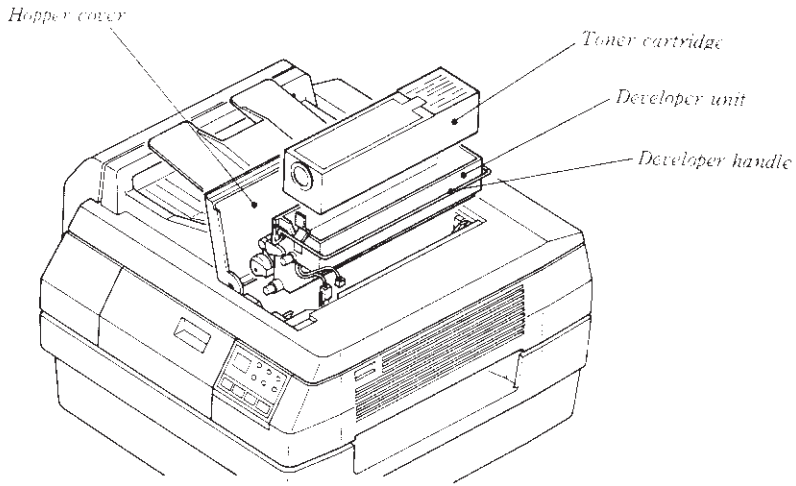


Figure 1.5 Toner Cartridge and Developer Unit

Toner cartridge: holds toner, a kind of powdered ink.
Developer unit: transfers toner to the drum, to develop the image written by the laser beam.
Developer handle: for removing the developer unit.

Caution

The printer is shipped from the factory with the toner cartridge uninstalled. Toner must be installed before the printer is used.

The printer does not operate if an accidental attempt is made to print before the toner cartridge is installed. An error code (C1) appears on the code display.

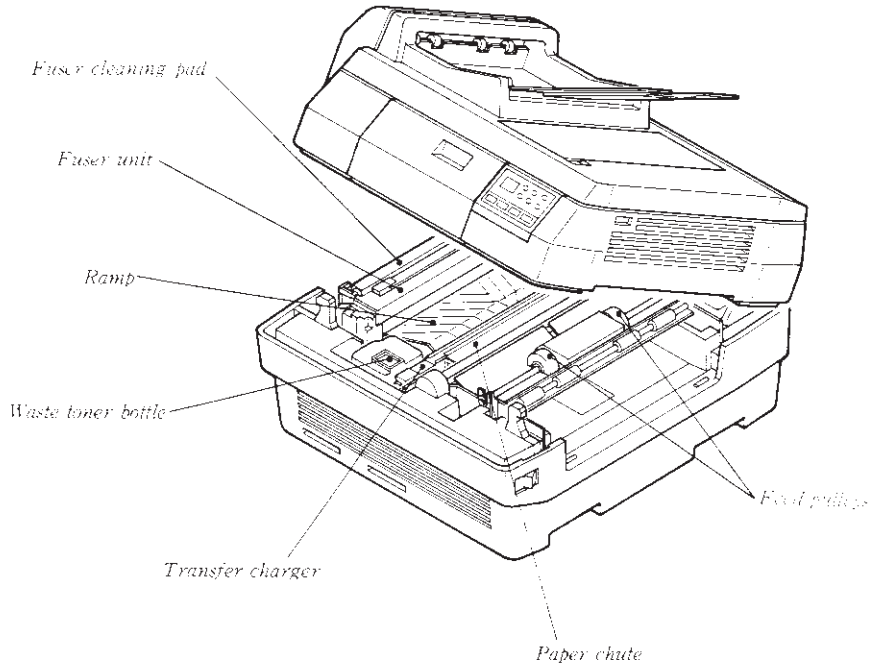


Figure 1.6 Interior of the Main Unit

Feed pulleys: feed paper into the printer.
Paper chute: guides the paper to the transfer charger.
Transfer charger: transfers the toner from the drum to the paper.
Waste toner bottle: collects toner that does not adhere to the paper.
Ramp: supports the paper as it moves from the transfer charger to the fuser.
Fuser unit: fuses the toner onto the paper.
Cleaning pad: lubricates and cleans the heat roller in the fuser.
Interlock switch: senses when the upper unit is open.

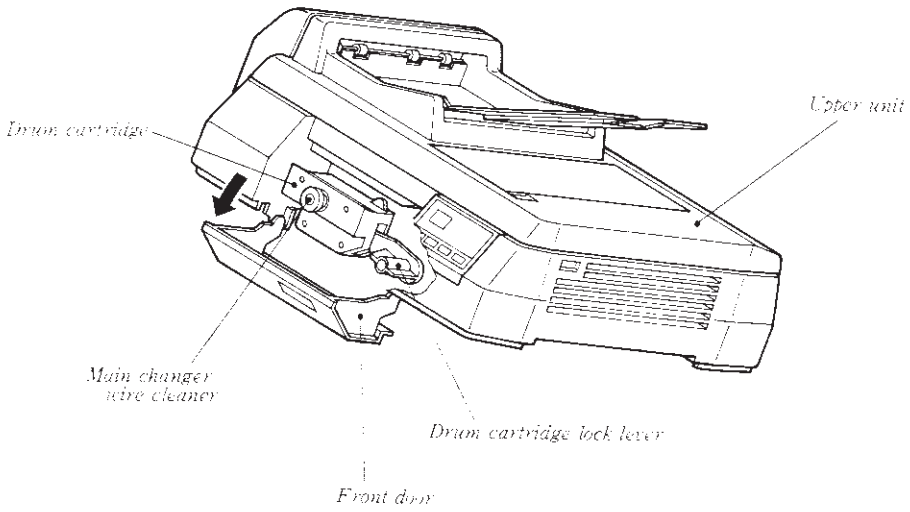


Figure 1.7 Drum Cartridge (Inside the Front Door)

Drum cartridge: contains the photosensitive drum, main charger, and cleaning system.

Main charger wire cleaner: cleans the main charger wire when pushed and pulled.

Drum cartridge lock lever: locks the drum cartridge in place.

1.2 Choosing a Location

Basic Requirements

The printer will work best if it is installed in a location that is:

- **Near the computer**

  The connecting cable should not be longer than 3 meters (10 feet).

- **Level and well supported**

  Place the printer on a sturdy table or desk.

- **Not exposed to sunlight or other bright light** (not next to an uncurtained window)

  Normal office lighting (500 lux) is fine. Brighter locations should be avoided so that strong light will not reach the drum when you open the printer for maintenance or to fix a paper jam.

- **Near an AC wall outlet,** preferably one that can be used for the printer alone (See the **Note on Power** on page 1-11.)

  Power requirements:

  Voltage: 100 V, 120 V, 220 V to 240 V, ± 10 % at each voltage

  Frequency: 50 Hz or 60 Hz, ±2%

  Current capacity: Max. 8.5 A at 100 V
  Max. 7 A at 120 V
  Max. 3.5 A at 220 V to 240 V

  The outlet should have a ground slot, or you should use an adapter.

  If you use an extension cord, the total length of the power cord plus extension cord should be 5 meters (17 feet) or less.

- **Well ventilated, not too hot or cold, and not too damp or dry**

  Temperature: 10°C to 32.5°C, ideally about 20°C
  (50°F to 90.5°F, ideally about 68°F)

  Humidity: 20% to 80%, ideally 65%

  If you install the printer where the temperature or humidity is outside the above ranges, you may not get the best print quality, and there will be increased chance of paper jam.

Clearance

Allow the necessary minimum clearances on all sides of the printer. See Figure 1.8. A total space of 155 cm by 199 cm (61 by 78 inches) is needed.

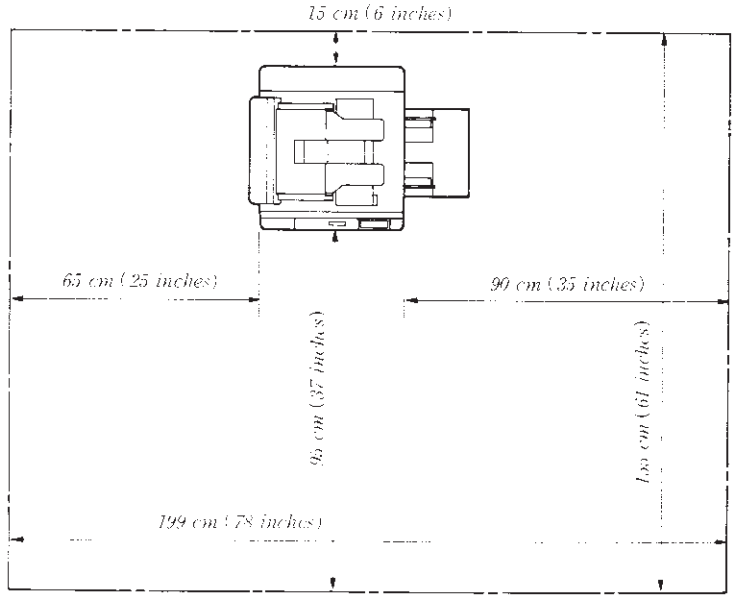


Figure 1.8 Minimum Clearances

Places to Avoid

Avoid installing the printer in locations exposed to:

- Direct drafts of hot or cold air
- Direct drafts of outside air (Avoid locations next to outside doors.)
- Sudden temperature or humidity changes
- Any source of high heat, such as a radiator or stove
- Excessive dust
- Vibration
- Ammonia fumes or other harmful fumes (If you are going to fumigate the room or saturate it with insecticide, move the printer out first!)
- Avoid greenhouse-like rooms (because of sunlight and humidity).
- Avoid enclosed spaces that block ventilation.
- Avoid sites more than 2000 meters (6500 feet) above sea level.

Note on Power

The laser printer should not be on the same power circuit as an air conditioner, fluorescent light, copier, or shredder, because these devices generate electrical noise on the power line. If it must share a power circuit with equipment like this, a high-frequency noise filter or isolation transformer is advisable. (Filters and transformers are available commercially.)

Avoid using plug multipliers to connect a large number of devices on the same circuit as the printer.

If the power from the outlet itself appears to be unstable, a line stabilizer should be used. In places where the voltage tends to fluctuate, it may be necessary to install a voltage regulator.

1.3 Unpacking and Inspection

The printer is packed as shown in Figure 1.9. When you unpack it, check that the listed parts are all present.

The printer is heavy. Unpacking it is a job for two people.

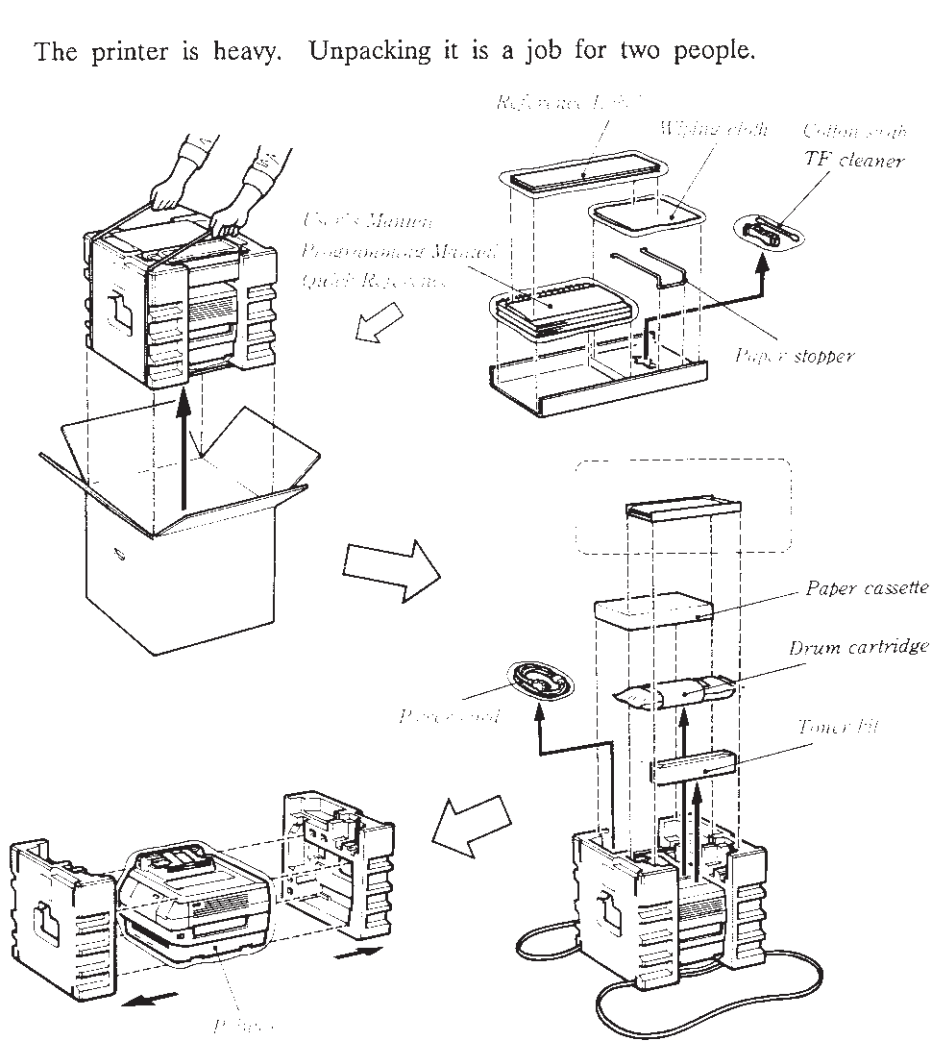


Figure 1.9 How the Printer Is Packed

List of shipped components:

- Printer
- Paper cassette (letter size or A4 size)
- Paper stopper wire for the paper tray
- Manual feed tray
- User's Manual
- Programming Manual
- Quick Reference
- Power cord
- Reference label
- Starter kit
  - Drum cartridge
  - Toner cartridge
  - Fuser cleaning pad
  - Waste toner bottle
  - Waste toner bottle cap
- Developer unit (already installed in the printer)
- Transfer charger unit (already installed in the printer)

Save the box and other packing materials in case you ever have to repack the printer for transportation. The repacking procedure is given on the next page.

1.4 Repacking

1. Remove the drum cartridge and developer unit and pack them separately. Handle them carefully.

2. Fit the front and back foam plastic spacers onto the printer.

3. Place the paper trays, paper cassettes, and toner kit in their packages and place these packages in their slots on top of the printer.

4. Place the two bands around the packed assembly.

5. Lift the printer by the two bands and lower it into the box. The printer is heavy, so the repacking job may require two people.

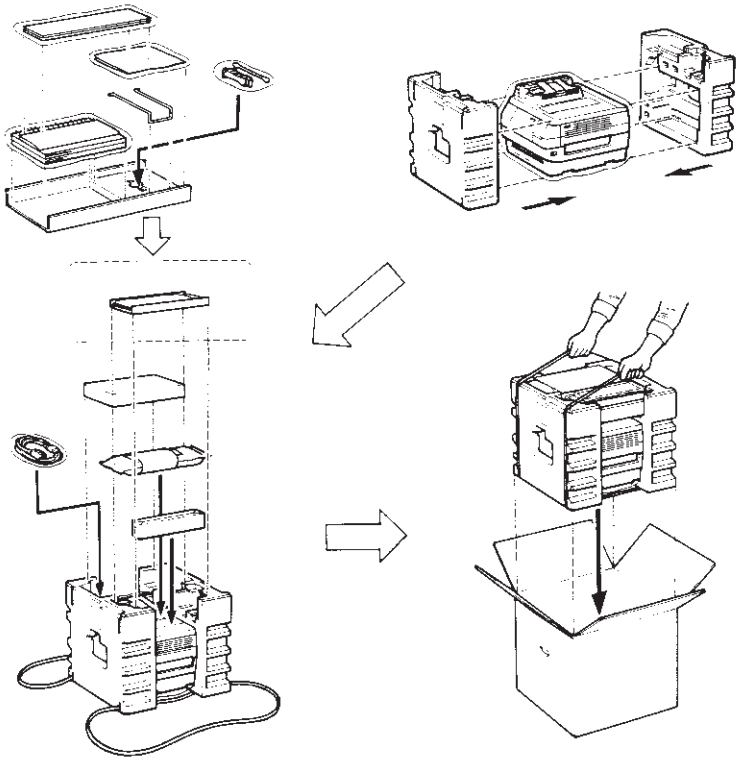


Figure 1.10 Repacking the Printer

1.5 Setup and Interfacing

The steps in setting the printer up are:

1. Open the upper unit.
2. Remove the fuser spacers.
3. Ready the drum cartridge.
4. Install the drum cartridge.
5. Install the fuser cleaning pad and waste toner bottle.
6. Close the upper unit.
7. Set paper.
8. Install the toner cartridge.
9. Attach the power cord.
10. Interface the printer to the computer.
11. Test the printer.
12. Test the interface with the computer.
13. Set the emulation mode.

Some of these steps may already have been performed when the printer is delivered. (The toner cartridge or drum cartridge may already be installed.) Skip any unnecessary steps.

1.4 Repacking

1. Remove the drum cartridge and developer unit and pack them separately. Handle them carefully.

2. Fit the front and back foam plastic spacers onto the printer.

3. Place the paper trays, paper cassettes, and toner kit in their packages and place these packages in their slots on top of the printer.

4. Place the two bands around the packed assembly.

5. Lift the printer by the two bands and lower it into the box. The printer is heavy, so the repacking job may require two people.

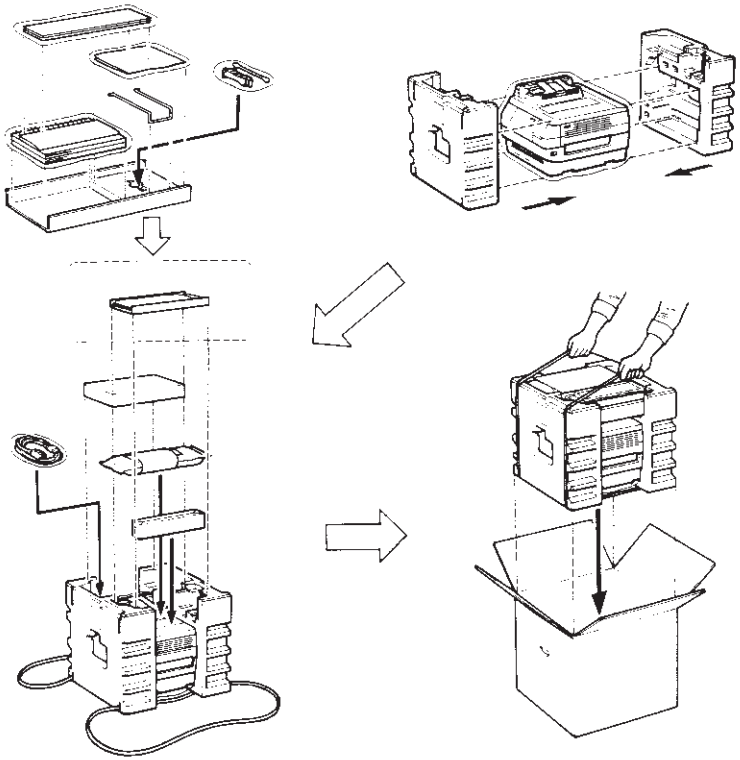


Figure 1.10 Repacking the Printer

1.5 Setup and Interfacing

The steps in setting the printer up are:

1. Open the upper unit.
2. Remove the fuser spacers.
3. Ready the drum cartridge.
4. Install the drum cartridge.
5. Install the fuser cleaning pad and waste toner bottle.
6. Close the upper unit.
7. Set paper.
8. Install the toner cartridge.
9. Attach the power cord.
10. Interface the printer to the computer.
11. Test the printer.
12. Test the interface with the computer.
13. Set the emulation mode.

Some of these steps may already have been performed when the printer is delivered. (The toner cartridge or drum cartridge may already be installed.) Skip any unnecessary steps.

1. Open the Upper Unit (Figure 1.11)

1. Remove any paper or other objects lying on top of the printer (so they will not fall behind the printer.)

2. Lift the release lever on the left side of the printer (at the arrow marked 1 in Figure 1.11).

3. Raise the upper unit all the way until it stops.

4. In preparation for installing the drum cartridge, open the front door (arrow 3 in Figure 1.11) and turn the cartridge lock lever to the open position (upright).

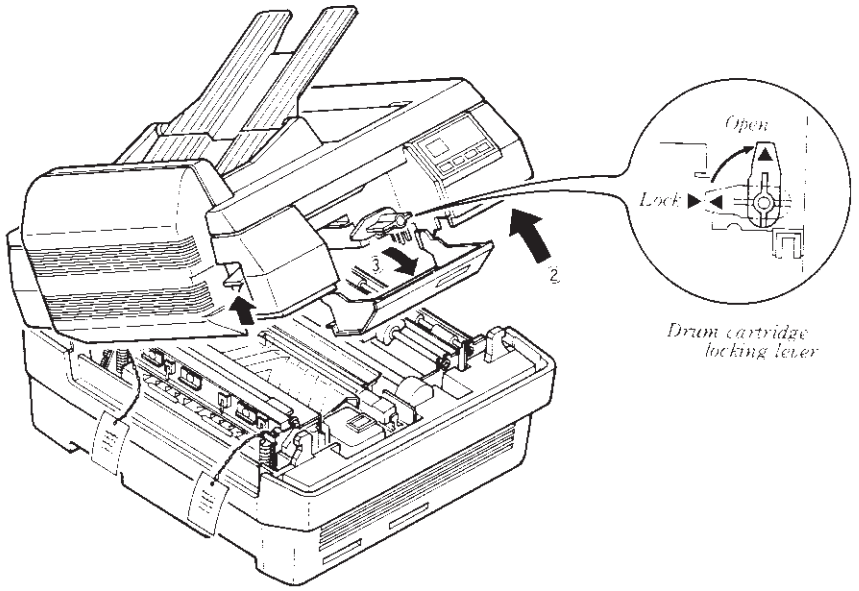


Figure 1.11 Opening the Upper Unit

2. Remove the Fuser Spacers (Figure 1.12)

Pull the two fuser spacers out as shown in Figure 1.12.

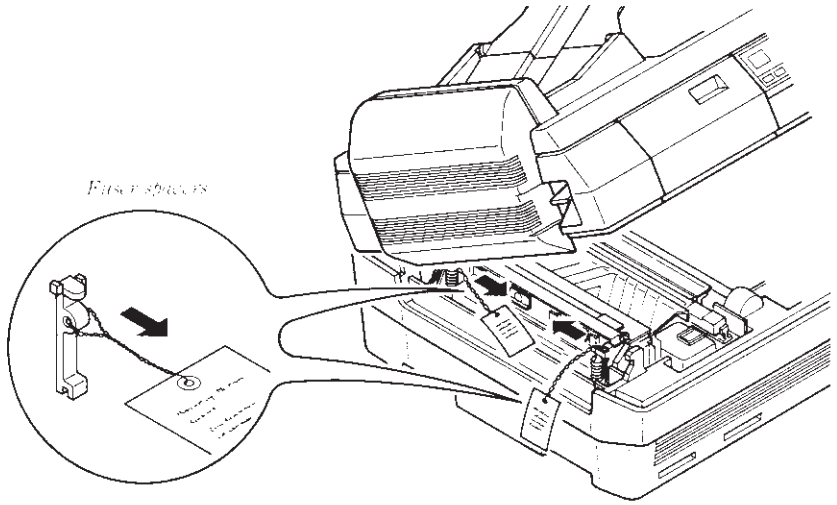


Figure 1.12 Removing the Fuser Spacers

3. Ready the Drum Cartridge (Figure 1.13)

The drum cartridge is packed in the starter kit supplied with the printer. It must be taken out and installed.

Caution

To avoid print quality problems:

Handle the new drum cartridge with care. Do not touch the green surface of the drum. Avoid any type of impact on the cartridge.

Do not expose the new drum to sunlight or other strong light, or even to normal indoor light for a long time. Five minutes in normal office lighting (500 lux) is the safe limit.

1. Take the drum cartridge from the starter kit.

2. Remove the drum cartridge cover from the cartridge.

3. Remove the drum cartridge spacer. The drum cartridge spacer is attached to an adhesive seal. Tear the seal and pull the spacer out. (See Figure 1.13.)

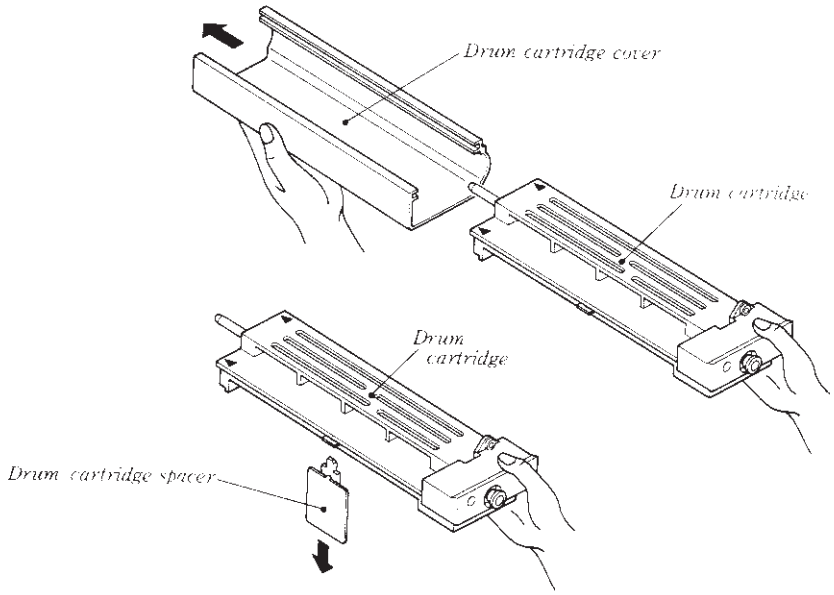


Figure 1.13 Removing the Drum Cartridge Spacer

4. Install the Drum Cartridge

Caution

When inserting the drum, be sure that no part of the printer touches the green drum surface.

Avoid impact. Impact can damage the drum cartridge.

Do not force the cartridge into the printer.

1. Set the drum cartridge on the two rails in the upper unit. Check that it is seated correctly on the rails, then insert it slowly. (Figure 1.14.)

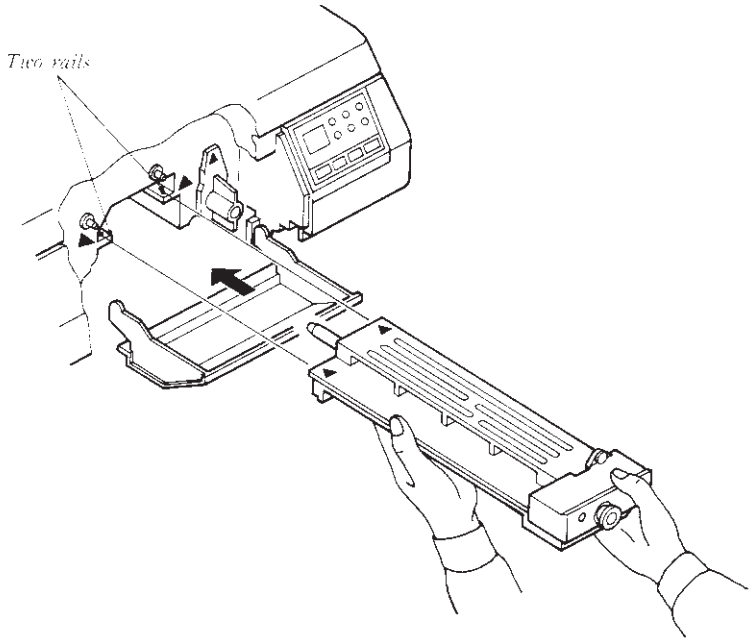


Figure 1.14 Inserting the Drum Cartridge

2. Check that the drum cartridge is inserted all the way, then turn the locking lever 90 degrees to the left, so that the two triangular marks align. Make sure that the cartridge is locked in securely. (See Figure 1.15.)

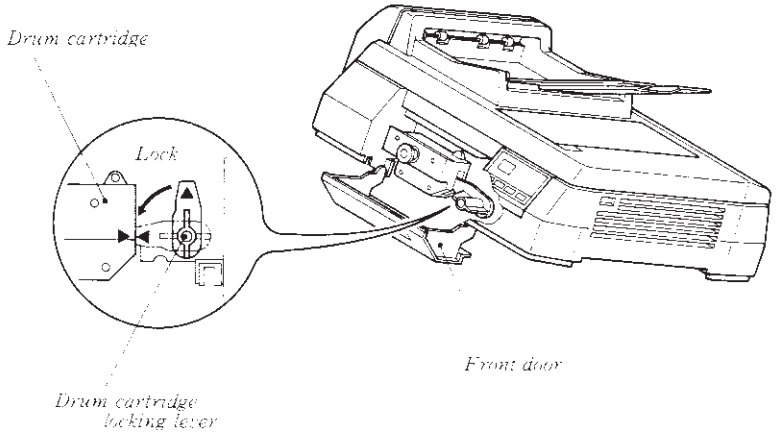


Figure 1.15 Locking the Drum Cartridge

3. Close the front door.

5. Install the Fuser Cleaning Pad and Waste Toner Bottle

The fuser cleaning pad, waste toner bottle, and toner cartridge are in the toner kit supplied with the printer. The cleaning pad and bottle must be installed in the lower unit. See Figure 1.16.

Caution

Be careful not to touch the drum.

1. Install the fuser cleaning pad. See Figure 1.16.

2. Install the waste toner bottle. See Figure 1.16.

Note

Check that the waste toner bottle is not capped. If it is capped, the upper unit will not close.

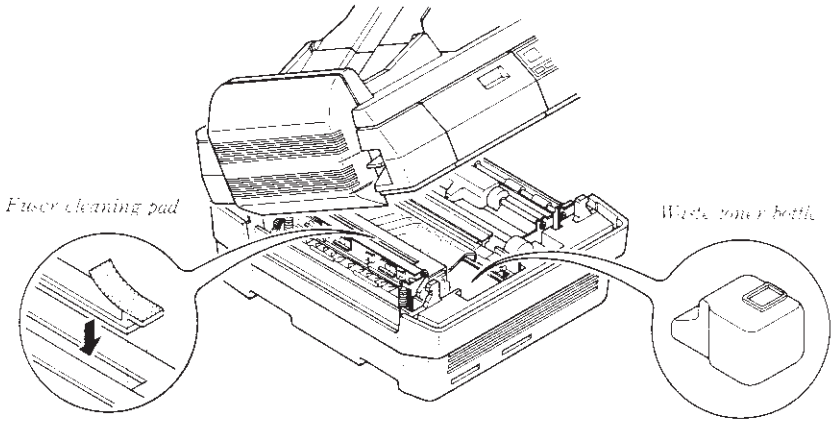


Figure 1.16 Installing the Fuser Cleaning Pad and Waste Toner Bottle

6. Close the Printer

Press the upper unit down slowly until it locks.

7. Set Paper (Figures 1.17 to 1.20)

1. Remove the manual feed tray from the paper cassette that comes with the printer. (Figure 1.17)

2. Set paper in the cassette. The paper size must match the cassette size. Tap the edges of the paper to align them neatly. (Figure 1.18)

3. Push the paper under the clips at the two corners. (Figure 1.19)

4. Replace the cover.

5. Insert the cassette into the cassette slot in the printer. Push it in as far as it will go. (Figure 1.20)

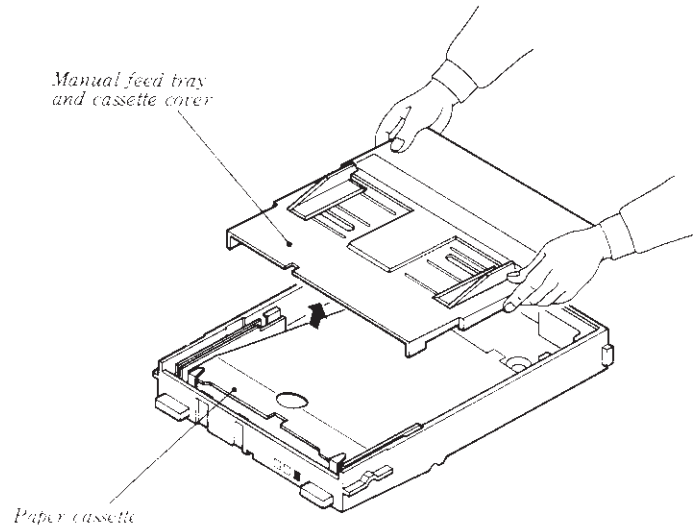


Figure 1.17 Removing the Manual Feed Tray

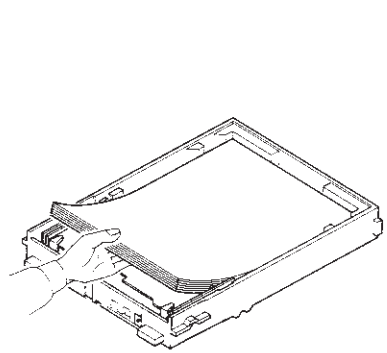


Figure 1.18 Setting Paper (1)

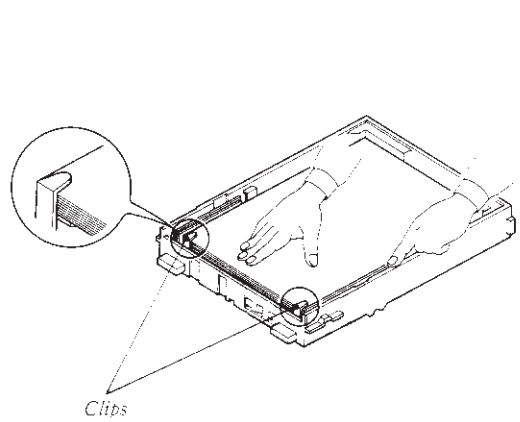


Figure 1.19 Setting Paper (2)

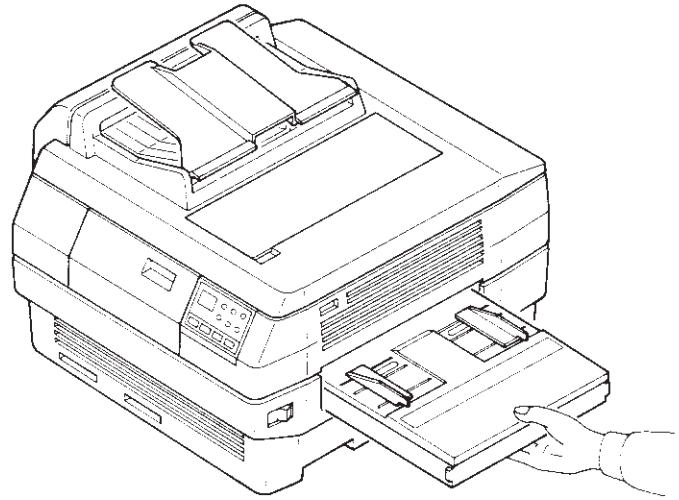


Figure 1.20 Mounting the Paper Cassette

8. Install the Toner Cartridge (Figure 1.21)

1. Turn the paper tray upward and open the hopper cover on top of the printer.

2. Give the toner cartridge a good shake to loosen and mix the toner inside. Be careful not to break the seal yet.

3. Insert the toner cartridge. Fit the tabs at the far end of the cartridge into the slots at the rear of the developer unit, and engage the near end of the cartridge with the cartridge stopper in the developer unit, as shown in Figure 1.21.

   The toner cartridge cannot be installed backward. Do not try to force it in.

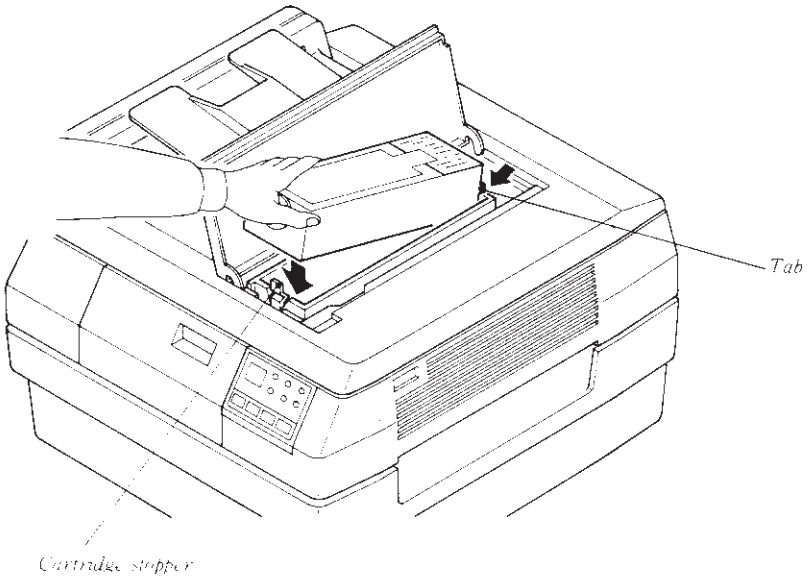


Figure 1.21 Installing the Toner Cartridge

4. The bottom of the toner cartridge is sealed with a clear plastic strip. The strip wraps around the end of the cartridge and is fastened to an instruction label on top. Tear the label to free the end of the sealing strip. (Figure 1.22)

Caution

Do this only after the cartridge is installed in the developer unit and securely locked in.

If the sealing strip is damaged or removed outside the printer, the cartridge cannot be installed.

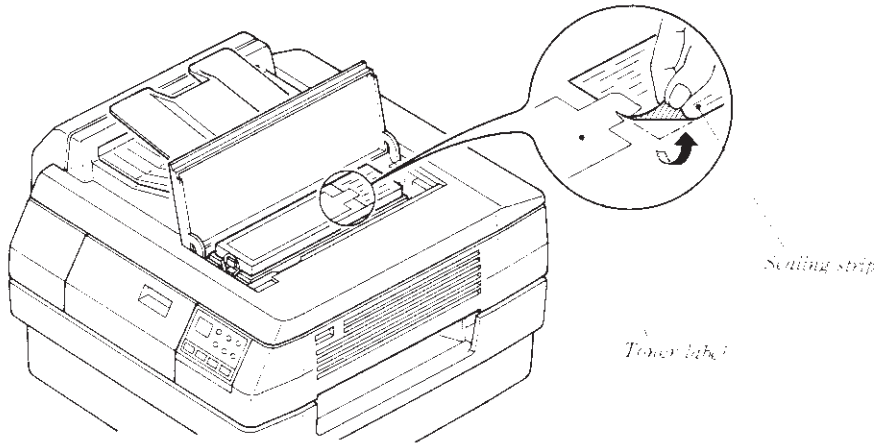


Figure 1.22 Freeing the End of the Sealing Strip

5. Hold the cartridge down with one hand, and carefully pull the sealing strip up and off. (Figure 1.23) The cartridge is now open at the bottom.

6. Close the hopper cover.

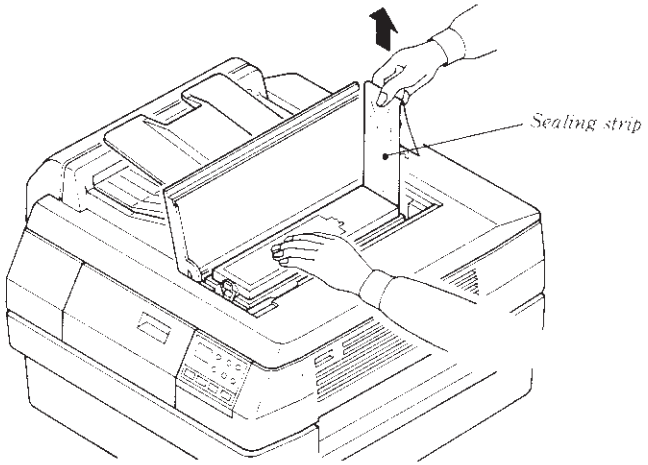


Figure 1.23 Removing the Sealing Strip

9. Attach the Power Cord

1. Check that the main switch is off (down on the OFF side).

2. Plug one end of the power cord into the receptacle at the back of the printer. (Figure 1.3)

3. Plug the other end into a wall outlet.

10. Connect the Printer to the Computer

The printer has two computer cable connectors. (See Figure 1.3.) The one marked Parallel is for a parallel (Centronics standard) interface. The one marked RS-232C is for a serial interface. You may use whichever is convenient for your computer. At power-up, the printer automatically senses which connector is in use and operates accordingly.

For details on the pin assignments of the cables, see Appendix D. Parallel cables usually have the standard pin assignment, so there should be no problem. RS-232C cables tend to vary, however, so if you use an RS-232C cable you may have to resolder its internal wiring.

Parallel interface

Plug one end of the cable into the connector marked Parallel on the printer. Close the clips on both sides to hold it in place.

Plug the other end into a parallel (Centronics) interface connector on your computer. This connector is usually marked PRINTER.

Serial interface

Follow the instructions in Appendix E.

11. Test the Printer

Test that the printer works by printing out a status page as follows.

1. Switch on the printer's power. (It does not matter whether the computer is on or off.) The ready (○) indicator should begin flashing.

2. Wait until the printer's ready (○) indicator stops flashing and stays lit. Check that the ON LINE indicator is also lit and the code display indicates 00.

Note

If the toner indicator (∴) lights when power is turned on, open the hopper cover, take out the developer unit, tilt it forward (near end down) about 45 degrees, shake it lightly to redistribute the toner, then replace it.

If the code display indicates C 1, you have forgotten to install the toner cartridge. Go back to step 8.

3. Press the ON LINE key. Check that the ON LINE indicator goes out. The printer is now off-line.

4. Press the STATUS key. The printer should print a page listing the positions of margins, memory allocations, and other information.

   A sample status printout is shown on the next page.

5. After printing the status page, press the ON LINE key again. The ON LINE indicator will come back on, indicating that the printer is ready to print data from the computer.

```
                LASER   PRINTER   STATUS   PAGE

Software version            , released
Units : Inches.           Page : Portrait.
Current font :      1.    Current country :  0.
Copies :  1.              Current emulation :  6.

Margins                     Spacings
  Top          0.300          Line          0.167
  Bottom      10.992          Character     0.100
  Left         0.000          Pen width     0.010
  Right        7.793

Memory allocation (Kbytes)
  User memory avail.     227.475 In use(System)    180.773
  Prescribe MCRO buff.     4.996 In use              0.000
  PCL MCRO buff.           3.500 In use              0.000
  Parallel buff. size     10.000   Active
  RS232C buff. size       10.000
  Raster size            512.000

Miscellaneous status
  Option(Comment)      Value  Option(Comment)      Value
  ---------------------------------------------------------
  C0(Reserved)             0  P1(Default Emulation)    6
  C1(Page orientation)     0  P2(C.R. action)          1
  C2(Dflt font Num-mid.)   0  P3(L.F. action)          1
  C3(Dflt font Num-low)    1  P9(Escape char.)        82
  C4(PCL MCRO buff.)       0  U0(Line/Inch_high)      6
  C5(Dflt font Num-High)   0  U1(Line/Inch_low)       0
  A1(Top margin_high)      0  U2(Char/Inch_high)      10
  A2(Top margin_low)       0  U3(Char/Inch_low)       0
  A3(Left margin_high)     0  U5(Status page)         0
  A4(Left margin_low)      0  U6(Country code)        0
  A5(Page length_high)    13  U7(Dflt symbol set)     0
  A6(Page length_low)     61  R0(Reserved)            0
  A7(Page width_high)      8  R1(Reserved)            0
  A8(Page width_low)      11  R2(Dflt paper size)     0
  H0(Prescribe macro)      0  R3(Reserved)            0
  H1(RS232C baud rate)    96  R4(Default cass.)       1
  H2(RS232C data bits)     8  R5(Reserved)            0
  H3(RS232C stop bit)      1  R6(Reserved)            0
  H4(RS232C parity bit)    0  R7(Manual paper size)   0
  H5(RS232C protocol)      0  R8(D.W. Data length)    7
  H6(Xoff threshold[%])   90  R9(Reserved)            0
  H7(Xon threshold[%])    70  M0(PAR buffer size)     1
  H8(RS232C buff. size)    1  M1(Reserved)            0
  H9(F.F. time out)        3  M2(Reserved)            0

Service information
  /0050/0025/1061/0811/AABCDF/AEBCDF/AHBCDF/
```

Figure 1.24 Status Printout (Sample)

12. Test the interface with the computer

To test that the printer and computer are correctly connected, have the computer command the printer to print a couple of lines of text. If you have connected the printer and computer with a parallel interface cable, follow the procedure given next. If you are using an RS-232C cable, the procedure is similar, and is given in Appendix E together with the cabling instructions.

1. Check that the code display indicates 00 and that the ready (○) and ON LINE indicators are on.

2. Power up the computer in BASIC mode.

3. Enter and run the following program.

```
10 LPRINT "INTERFACE TEST"
20 LPRINT "TEST SUCCESSFUL"
30 LPRINT CHR$(12)
40 END
```

If the printer prints a page with the following two lines the top left corner, the computer and printer are connected correctly.

```
INTERFACE TEST
TEST SUCCESSFUL
```

If you do not get this result, check that the cable is securely plugged in at both ends and repeat the test. If you still do not get the right result, you may have a defective or improperly-wired cable. Try using a different cable.

13. Set the emulation mode

The laser printer emulates the operation of any of seven other printers. It is factory-set to emulate the HP LaserJet series II. If you intend to use software that supports the LaserJet series II, LaserJet+ or the LaserJet, or that supports the laser printer itself, the factory setting is the one you want, so you do not have to do anything. If you intend to use software that supports another printer, you must change the printer's emulation mode.

To change the emulation mode, enter and run the following BASIC program:

```
10 REM   EMULATION MODES
15 PRINT "0--LINE PRINTER"
20 PRINT "1--IBM-PC GRAPHICS PRINTER"
25 PRINT "2--DIABLO 630"
30 PRINT "3--QUME SPRINT 11"
35 PRINT "4--NEC SPINWRITER"
40 PRINT "5--EPSON FX-80"
45 PRINT "6--HP LASERJET SERIES II"
50 PRINT
55 INPUT "DESIRED EMULATION"; N
60 REM  SET EMULATION
65 LPRINT "!R! FRPO P1,"; N
70 REM  FOR IBM OR FX-80 EMULATION, SET LINEFEED ACTION TO LF + CR
75 IF N=1 OR N=5 THEN LPRINT "; FRPO P3, 2;"
80 REM  FOR OTHER EMULATIONS, SET LINEFEED ACTION TO LF ONLY
85 IF N=0 OR N=2 OR N=3 OR N=4 OR N=6 THEN LPRINT "; FRPO P3, 1;"
90 LPRINT "EXIT;"
95 END
```

When this program is run, the printer changes immediately to the selected emulation and thereafter powers up in that emulation. Save the above program so that you can use it to change the printer's emulation again if necessary.

1.6 Prolonged Non-Use

If you ever leave the printer unused for a long period of time, remove the power cord from the wall outlet.

1.7 Moving the Printer

When you move the printer:

- Move it gently, to avoid damaging the drum.
- Keep it as level as possible, to avoid spilling toner inside the printer.

If you move the printer by car or truck, remove the developer unit and drum cartridge and transport them separately. The drum cartridge in particular should be handled carefully and protected from light.

Note

Consult your serviceman before attempting long-distance transportation of the printer.

CHAPTER 2

OPERATING THE LASER PRINTER

This chapter explains the printer's control panel and operating procedures.

Section 2.1 describes the printer's control panel. Tables list the functions of the keys and indicators.

Section 2.2 gives detailed operating procedures.

Sections 2.3 to 2.5 cover page formatting, manual paper feed, and IC cards.

2.1 Control Panel

The laser printer's control panel is compactly designed with just four keys and six indicator lamps. Key and lamp functions are explained by simple labels or icons.

There is also a two-digit code display which usually indicates 00 (ready) or dP (data processing). Other codes are error or maintenance codes.

Layout

Figure 2.1 shows the control panel layout.

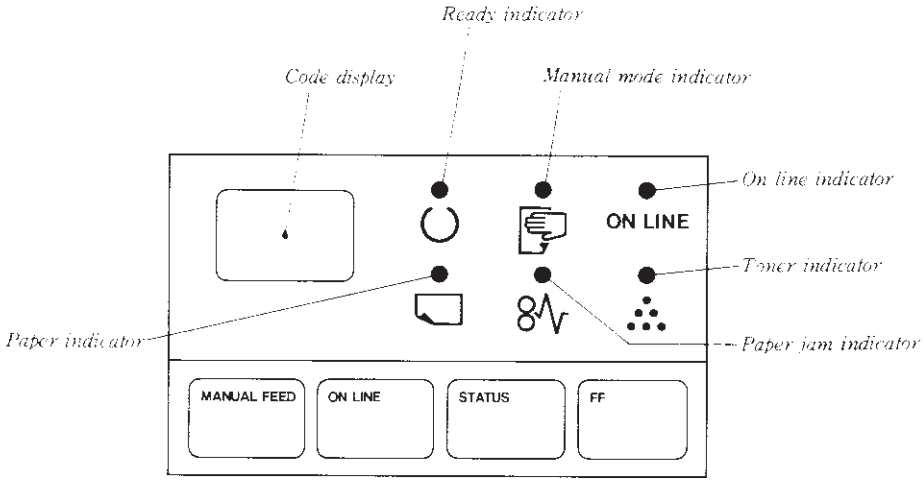


Figure 2.1 Control Panel Layout

Indicators and Code Display

The printer constantly monitors its internal condition. When it needs attention, it lets you know by an indicator lamp or the code display. Indicators also show whether the printer is set for manual or cassette paper feed, and whether it is on-line.

Table 2.1 explains the meanings of the indicators. Table 2.2 explains the code display.

Indicator		State	Meaning
(Ready)		Off	Power is off or the printer is inoperable (for a reason indicated by the code display—see Table 2.2).
		Flashing	The printer is warming up.
		On	The printer is ready to print, or is printing.
ON LINE		Off	The printer is off line (does not print received data).
		On	The printer is on line (prints received data).
(Manual feed)		Off	Paper is fed from the cassette.
		On	Paper must be fed by hand.
(Paper jam)		Off	Paper is feeding through the printer normally.
		Flashing	Paper is jammed. See Section 4.6 (page 4-12).
(Toner)		Off	There is enough toner in the toner cartridge.
		Flashing	A new toner kit should be installed. See Section 3.2 (page 3-5).
(Paper)	Cassette paper feed	Off	There is paper in the cassette.
		Flashing	The cassette is empty, or is not mounted
	Manual paper feed	Off	Paper is set in the printer.
		Flashing	Paper is not set.

Table 2.1 Control Panel Indicators

Display	Meaning
	Power is off.
00	The printer is warming up or is ready to print. The ready indicator (○) flashes during warmup.
dP	The controller is processing data (receiving data from the computer, reading an IC card, generating a DYNAMIC font, generating graphics, or printing).
01	The upper unit is not closed.
02	The face-down unit is not closed.
03	The hopper cover is not closed.
L1	A new drum kit should be installed. See Section 3.3.
L2	A new developer kit should be installed. See Section 3.4.
L3	The fuser needs to be replaced. Call a serviceman.
C1	The toner supply is exhausted. A new toner kit must be installed. See Section 3.2. *Note: The toner kit should be replaced at the first opportunity after the toner indicator lights. The printer does not print when the C1 code is displayed.*
En (n=1, 2,...) E1	Mechanical problem. Call a serviceman. *Note: The printer does not print when a code starting with E is displayed.*
Fn (n=1, 2,...) F1	Controller error. Call a serviceman. *Note: The printer does not print when a code starting with F is displayed.*

Table 2.2 Code Display

Keys

Table 2.3 summarizes functions of the four keys. There are seven functions because the MANUAL FEED key acts as a shift key: when it is pressed and held down, it changes the functions of the other keys. Detailed operating procedures are given in Section 2.2.

Most printing is controlled entirely by the computer, without the need to operate the panel controls.

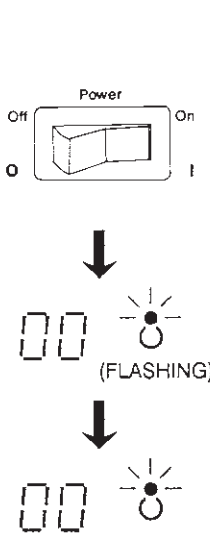
Key	Function	Notes
MANUAL FEED	Select manual paper feed	See Section 2.4
ON LINE	Pause or restart printing	See the notes below
STATUS	Print a status page	The printer must be off-line and ready
FF	Print one page	Does not print a blank page
MANUAL FEED (hold) ON LINE	Reset the RS-232C parameters to: Baud rate: 9600 bps Character length: 8 bits Stop bit: 1 Parity check: None Protocols: XON/XOFF, ETX/ACK, DTR (positive)	Does not affect the parallel interface
MANUAL FEED (hold) STATUS	Stop printing, clear the printer's buffer, and reset the copy count to 1	To abandon a printing job
MANUAL FEED (hold) FF	Reread IC cards	Don't change IC cards while power is on!

Table 2.3 Keys

- The ON LINE key only starts and stops printing temporarily. When it is pressed to set the printer off-line, communication with the computer does not stop and no data are lost. Data are stored in the printer's buffer.
- Printing is automatic while the printer is on-line. While off-line, data can be printed one page at a time by pressing the FF key.

2.2 Operating Procedures

Switching Power On



Check that the power cord is securely plugged in at both ends.

Check that the printer is connected to the computer.

If you intend to use IC cards, insert them now, before switching power on.

Push the main switch at the position marked **ON** (also marked I).

Wait for the printer to warm up. During warm-up the ready indicator (○) flashes and the code display indicates 00.

At the end of the warm-up period, the flashing stops, the ON LINE indicator lights, the ready indicator stays lit, and the code display continues to indicate 00.

The printer is now ready to print.

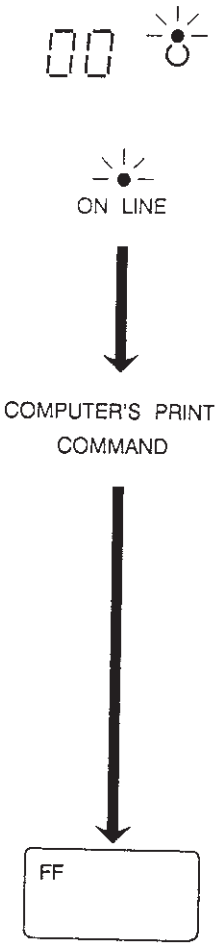
If an indicator other than ready (○) and ON LINE lights or the code display is not 00, take the necessary action. See Tables 2.1 and 2.2.

In switching power on, the general rule is to switch on printer power first, computer power second.

Printing

This procedure prints on cassette paper.

The manual feed procedure is described in Section 2.4.



Switch on power and wait for the printer to become ready.

Check that the code display indicates 00, the ready (○) and ON LINE indicators are lit (nonflashing), and no other indicators are lit.

If another indicator is lit, take the necessary corrective action.

Command your computer to start printing.

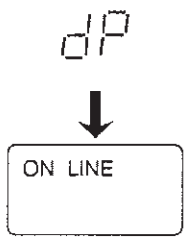
Paper feeding and printing are entirely automatic. During printing, the code display indicates dP.

If paper runs out during printing, the printer pauses with the paper (⏎) indicator flashing. Remove the cassette, add more paper, then replace the cassette. Printing continues automatically from the point of the interruption.

At the end of the printing job, if the last page does not feed out promptly, press the FF key.

Temporary Print Pause

The printer can be stopped temporarily during a printing job. For example, you can pause near the beginning of a long job to check that the output is correctly formatted before proceeding.



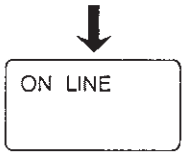
This procedure can be used while the printer is printing.

Press the ON LINE key to set the printer off-line.

The ON LINE indicator goes off.

The printer stops printing after finishing the current page.

While off-line, the printer continues to communicate with the computer. If desired, additional pages can be printed one at a time by pressing the FF key.



To continue normal printing, press the ON LINE key again.

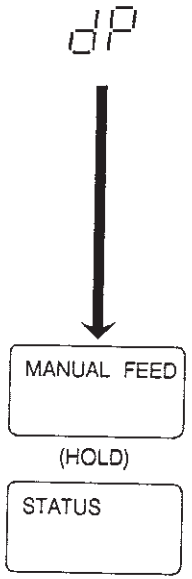
The ON LINE indicator goes on.

The printer resumes printing from the next page.

No data are lost while the printer is in its temporary pause. When the printer's buffer becomes full, the printer sends a signal instructing the computer to wait before sending more data.

Abandoning a Printing Job

You can abandon a printing job before it is completed as follows.



This procedure can be used to abandon a printing job while the code display indicates dP.

Halt the printing program on the computer.

The printer continues to print the data in its buffer.

Press the MANUAL FEED key and hold it down.

Then also press the STATUS key.

The printer finishes printing the current page and sometimes a few more pages, then stops with its buffer empty, ready to start the next job.

The copy count is reset to 1.

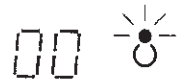
Caution

If you do not stop the computer program first, after the printer executes the printing halt, it immediately starts printing again as it continues to receive data from the computer.

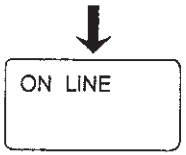
There is a gap in the printed output because of the data lost when the printer cleared its buffer.

Status Printout

If you want to check the printer's current status, including available memory space, option settings, and nonresident fonts, you can find the information you need on the status page. To print out a status page, proceed as follows.

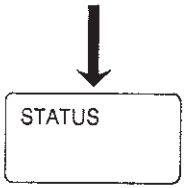


A status page can be printed whenever the printer is ready.



If necessary, press the ON LINE key to set the printer off-line.

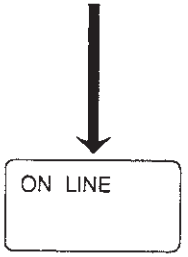
The ON LINE indicator goes off.



Press the STATUS key.

The printer prints a page of status information.

The code display indicates dP during printing of the status page, then returns to 00.



Press the ON LINE key to set the printer back on-line.

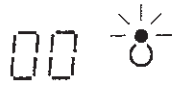
For a full description of the status page, see the STATUS command in the Programming Manual.

A status page cannot be printed while the printer is temporarily paused during a printing job. The code display must indicate 00, not dP, at the start of this procedure.

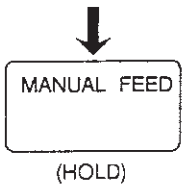
If a status page jams while being printed, open the printer, clear the jam, close the printer, then press the ON LINE key to set the printer back on-line. The status page will be printed automatically.

RS-232C Reset Procedure

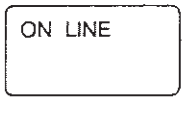
If you experience trouble with RS-232C communications, you can reset the RS-232C parameters to their standard values as follows:



The RS-232C parameters can be reset whenever the printer is ready.



Press the MANUAL FEED key and hold it down.



Then also press the ON LINE key. This operation resets the RS-232C parameters.

The printer's RS-232C parameters are reset to the values below.

Baud rate	9600 bits per second
Data length	8 bits per character
Stop bits	1
Parity	None
Protocol	XON/XOFF, DTR (positive logic), and ETX/ACK (All three protocols simultaneously; the computer can use any one of the protocols)

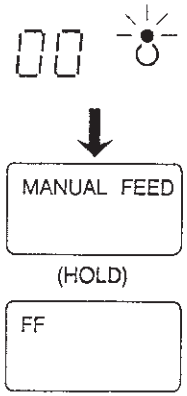
Set your computer to the same parameter values by using the computer's DIP switches or an appropriate command.

The reset remains in effect until power is switched off.

After establishing communication with the computer, you should set the printer to the RS-232C parameters you intend to use permanently with the FRPO command. See the Programming Manual for details.

Rereading an IC Card

Although information is read from IC cards into the printer's memory at power-up, the information may be deleted from memory later. For example, font patterns read from an IC card can be deleted by the PRESCRIBE DAF command. If necessary, deleted information can be reread from IC cards into memory by the procedure below.



IC cards can be reread whenever the printer is ready.

Press the MANUAL FEED key and hold it down.

Then also press the FF key.

This operation rereads the IC card information. The code display indicates during the rereading.

The printer cannot communicate with the computer while it is rereading an IC card.

Caution

Do not use this procedure to read a new IC card. IC cards must not be inserted or removed while power is on.

2.3 Page Formatting

When printing with word-processing or graphics software, you can rely on your software's page and text formatting functions. Provided the emulation mode matches the software, the printer will correctly execute the software's formatting commands.

If you need to do your own formatting without software assistance, you can use the printer's PRESCRIBE command language. A sample PRESCRIBE formatting sequence in a BASIC program is given below. This sequence can be run to set the printer up before listing other BASIC programs with the LLIST command.

This formatting sequence selects the printer's 12-point Let. Gothic font (font 8). It sets 1-inch top and left margins. The line spacing is 5 lines per inch, with 45 lines per page.

```
10 REM ---------- LASER PRINTER LIST FORMATTING PROGRAM ----------
20 LPRINT "!R! RES;"            :REM Enter command mode and reset
30 LPRINT "FTMD 13;"            :REM Ensures correct character spacing
40 LPRINT "FONT  8;"            :REM Let. Gothic
50 LPRINT "STM   1;"            :REM Set Top Margin to 1 inch
60 LPRINT "SLM   1;"            :REM Set Left Margin to 1 inch
70 LPRINT "SLPI  5;"            :REM Set 5 Lines Per Inch
80 LPRINT "SLPP 45;"            :REM Set 45 Lines Per Page
90 LPRINT "EXIT, E;"            :REM Exit command mode
```

Note that "margins" are defined as measured from the top and left edges and are 5 milli-meters larger than the specified values, when measured from the paper edge.

Full information on these and other PRESCRIBE commands is given in the Programming manual.

2.4 Manual Paper Feeding

Manual paper feeding enables the printer to print on any size of paper from post-card size up to the size of the cassette currently installed. Appendix C lists the usable types of paper.

The cover of the paper cassette serves as the manual feed tray, so even for manual feed, the cassette must be installed in the printer. Begin by adjusting the paper guides to the size of the paper.

The guides feed the paper in straight and accurately centered. However, the printer does not sense the position of the paper guides. The printer assumes that all manually fed paper has the same size as cassette paper.

To print text in the desired position, *you must therefore allow extra margins.* Extra left margin is required in the portrait orientation. Extra top and left margins are required in the landscape orientation. Details are given in the Programming Manual (Chapter 5).

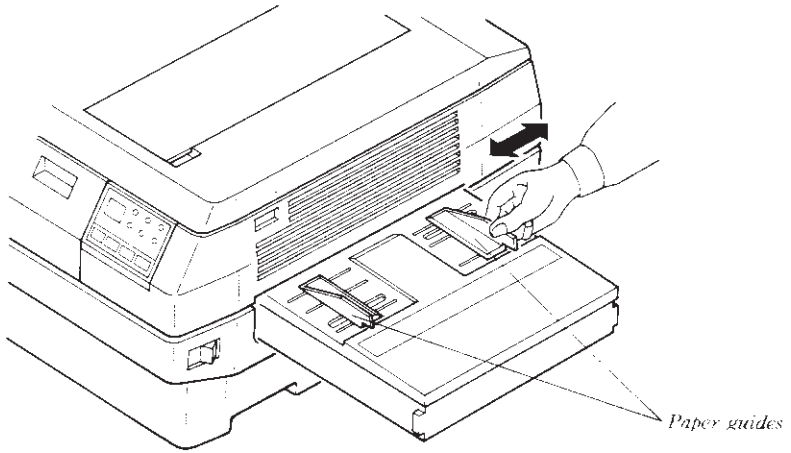


Figure 2.2 Adjusting the Paper Guides

Manual Feeding Procedure

1. Check that the printer is on-line and ready.

   The ON LINE indicator should be lit and the code display should indicate 00.

2. Press the MANUAL FEED key to select manual paper feed, making the indicator light.

   Unless you have already placed paper on the manual feed tray, the paper indicator ( ) will flash and the ready indicator ( ) will go out.

3. Place one sheet of paper on the manual feed tray and insert it as far as it will go. (Figure 2.3) The paper indicator will go out and the ready indicator will come on.

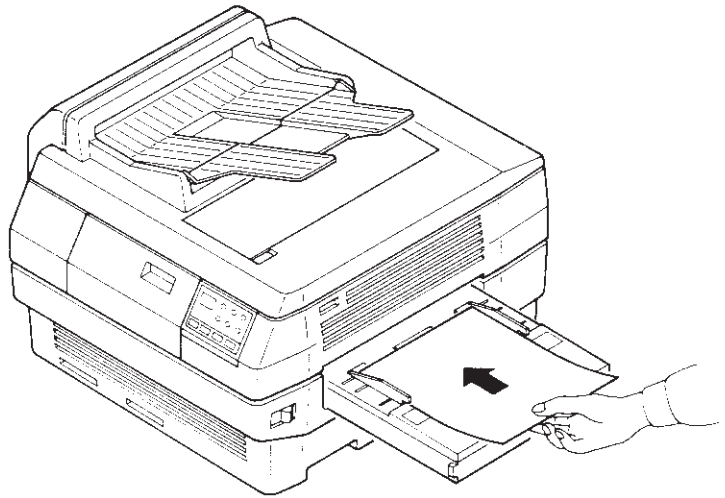


Figure 2.3 Manual Paper Feeding

4. Send printing commands and data from the computer.

5. Feed more paper by hand when the printer's paper indicator flashes.

Note

Manual feed can also be controlled by the CASS command of the PRESCRIBE command language. See the Programming Manual for details.

Feeding Envelopes

Envelopes should be fed in face up, right edge first.

Set the printer to print in the landscape page orientation. Be sure to select a landscape font.

Large extra top and left margins must be allowed. If no extra margin is allowed, the printing may miss the envelope completely. The margin values depend on the envelope size. See the Programming Manual (Chapter 5) for details.

Not all envelopes print well. See Appendix C for details on suitable types of envelopes.

2.5 IC Cards

IC cards are microchip memory cards containing, for example, nonresident fonts. The printer reads the contents of the cards into its internal memory when power is switched on. Their presence in memory can be confirmed on the status printout.

Two IC card slots are located at the bottom front of the printer. When you insert only one card, it can go in either slot.

To insert and use an IC card:

1. Switch printer power OFF.

Caution

Never insert or remove an IC card while power is on.

2. Insert the IC card in either slot. Insert it face up, connector end first. Push it in all the way.

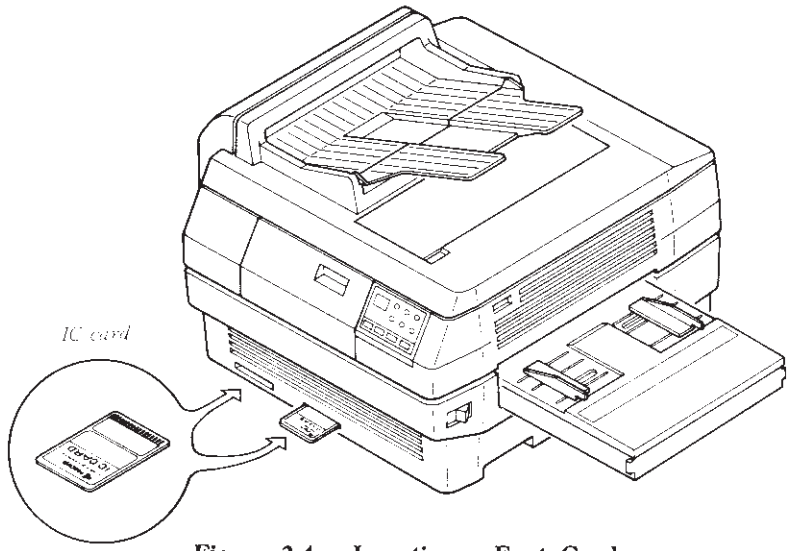


Figure 2.4 Inserting a Font Card

3. Switch printer power on. The printer reads the contents of the card during its power-up sequence. The information (nonresident fonts, etc.) on the card is now available for use.

4. If the IC card information is deleted from the printer's memory during the printing process, it can be reread by pressing the MANUAL FEED and FF keys together. See Section 2.2.

Caution

IC cards contain sensitive electronic circuits. Treat them with appropriate care.

Never attempt to force an IC card into its slot.

Never bend an IC card.

Avoid impact. Do not drop an IC card.

Do not spill water or other liquids on an IC card.

Keep IC cards away from open flames and other sources of heat.

Do not leave IC cards lying in direct sunlight.

CHAPTER 3
MAINTENANCE

To maintain high print quality, you must install new toner, drum, and developer kits at regular intervals. The fuser unit also requires periodic replacement. A code display on the control panel indicates when a replacement is required.

You should also clean the charger wires occasionally. The symptoms that cleaning is needed are print quality problems, described in Section 4.4.

Section 3.1 below shows the maintenance schedule. Sections 3.2 to 3.4 give the step-by-step procedures for user-performable maintenance.

3.1 Maintenance Schedule

When the printer needs maintenance attention, it indicates by lighting the toner indicator (∴) or displaying a code beginning with the letter C or L.

When the code C 1 (C1) is displayed, the printer is out of toner. To avoid possible damage, the printer stops working until a new toner kit is installed. The toner kit is user-installable.

In other cases the printer continues to operate, but the necessary maintenance should be performed as quickly as possible, to avoid bad printouts and possible equipment problems. The drum and developer kits are user-replaceable.

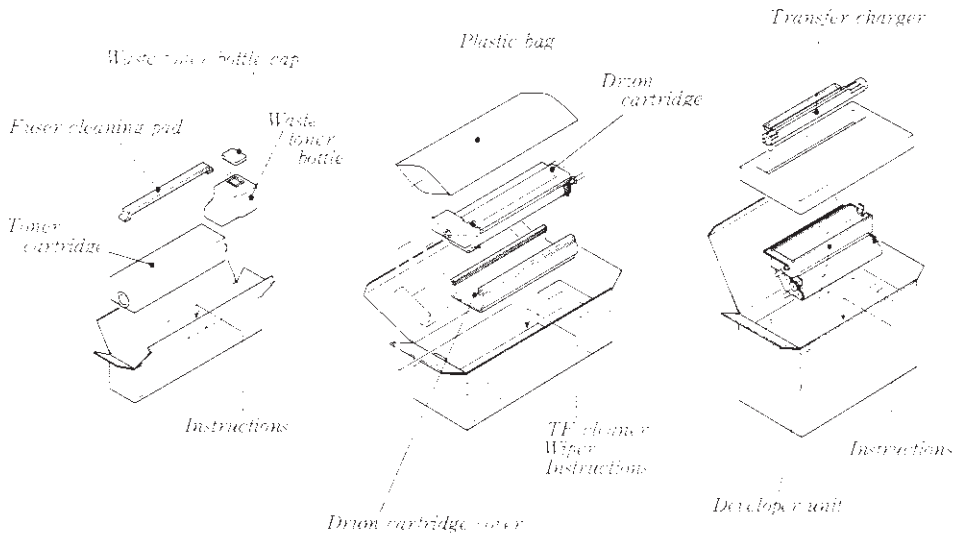
Table 3.1 summarizes the maintenance schedule. The maintenance kits are described in Table 3.2 and Figure 3.1.

Code	Maintenance procedure	Approximate maintenance interval	Action
∴	Toner kit replacement	Every 3000 pages (2500 the first time) Varies depending on the amount of printing per page.	Replace the toner cartridge, waste toner bottle, and fuser cleaning pad. See Section 3.2.
L 1	Drum kit replacement	Every 10,000 pages	Replace the drum cartridge and clean various parts. See Section 3.3.
L 2	Developer (and toner) replacement	Every 50,000 pages	Install a new developer and toner kit. See Section 3.4.
L 3	Fuser replacement	Every 80,000 pages	Have a serviceman perform this maintenance.

Table 3.1 Maintenance Schedule

Kit	Contents	
Toner kit	Toner cartridge	(1)
	Waste toner bottle	(1)
	Waste toner bottle cap	(1)
	Fuser cleaning pad	(1)
	Instructions	(1)
Drum kit	Drum cartridge	(1)
	TF cleaner	(1)
	Cotton swab	(1)
	Wiper	(1)
	Instructions	(1)
Developer kit	Developer unit	(1)
	Transfer charger	(1)
	Instructions	(1)

Table 2 Maintenance Kits



Toner Kit **Drum Kit** **Developer Kit**

Figure 3.1 Packing of the Maintenance Kits

In addition to the maintenance procedures described on the following pages, the corona charger wires in the transfer charger unit and drum cartridge should be cleaned from time to time, whenever print quality problems occur.

To clean the charger wire in the drum cartridge, raise the upper unit, open the front door, and pull the orange cleaner knob slowly in and out a few times. This pulls a cleaning pad along the wire.

To clean the transfer charger wire, take the cleaning tool (TF cleaner) from the drum kit, place it on the transfer charger, and slide it back and forth a few times.

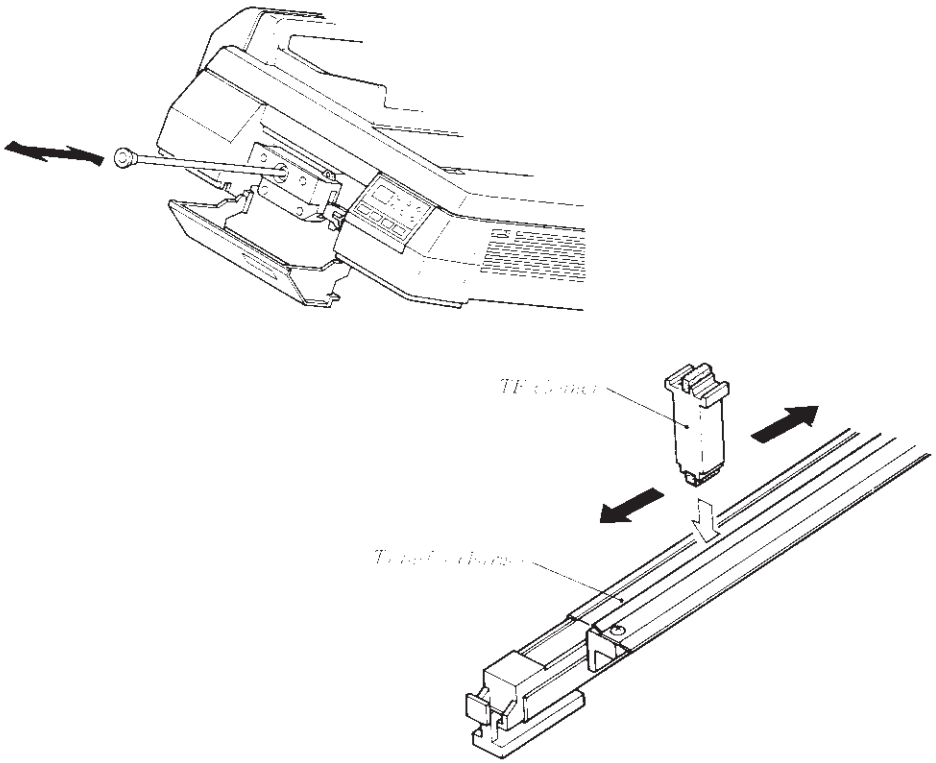


Figure 3.2 Cleaning the Main Charger and Transfer Charger Wires

3.2 Toner Kit Replacement

When the printer begins to run low on toner, the toner indicator (∴) comes on: first flashing, then staying lit steadily as the remaining toner supply dwindles. Nothing is gained by waiting for the printer to run out of toner completely. At the earliest convenient opportunity after the toner indicator begins flashing, you should replenish the supply by installing a new toner kit.

If you continue to use the printer, eventually the toner supply will be exhausted and the C 1 (C1) code will be displayed. At this point, to avoid damaging the developer, the printer stops printing. To continue printing, you must install a new toner kit.

Always replace all three items in the toner kit (toner cartridge, waste toner bottle, and fuser cleaning pad) at the same time. In particular, if you do not replace the waste toner bottle, it may overflow later, because the printer monitors only the status of the toner supply.

Caution

Do not leave floppy disks etc. lying around while performing this maintenance procedure. This procedure tends to raise a little toner dust, which can harm magnetic recording media.

1. Remove any paper or other objects lying on top of the printer.

2. Open the upper unit. Raise the release lever on the left side of the printer, then slowly lift the upper unit as in Figure 3.3.

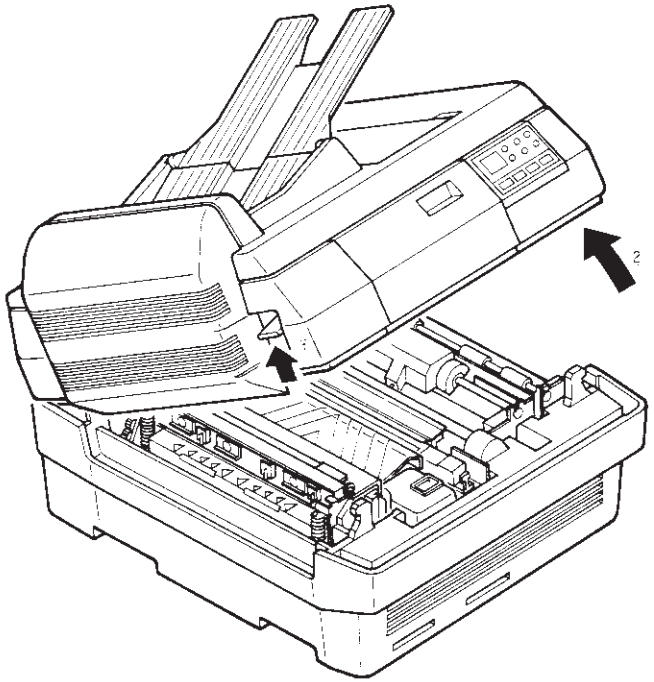


Figure 3.3 Opening the Upper Unit

Caution

Be careful not to touch the drum surface or expose it to strong light. The drum is extremely sensitive. Damage to its surface can impair print quality.

3. Replace the waste toner bottle.

Remove the waste toner bottle from the lower unit as in Figure 3.4. Cap it with the cap in the new toner kit and dispose of it. Then install the new waste toner bottle in the lower unit.

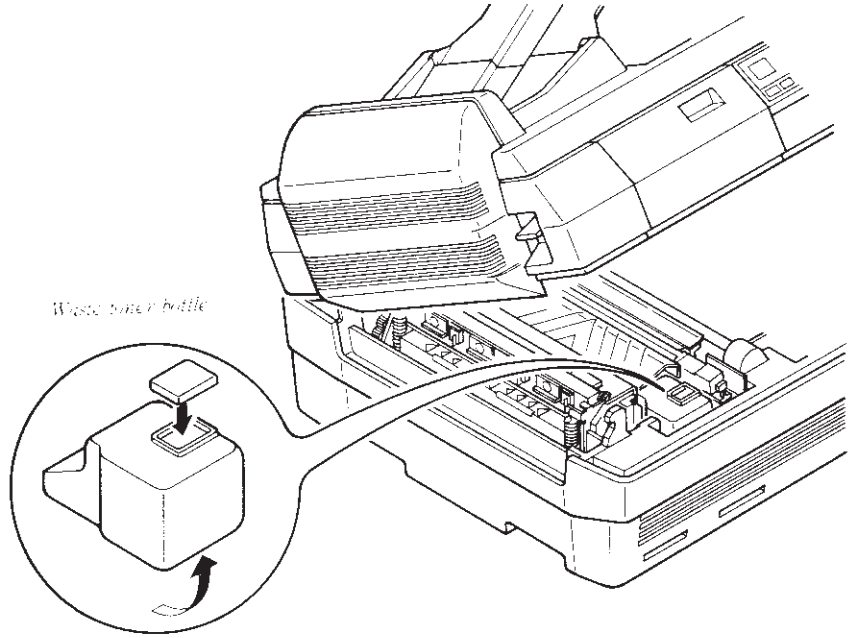


Figure 3.4 Replacing the Waste Toner Bottle

4. Replace the fuser cleaning pad.

   Remove the cleaning pad from the fuser as shown in Figure 3.5, then insert a new cleaning pad.

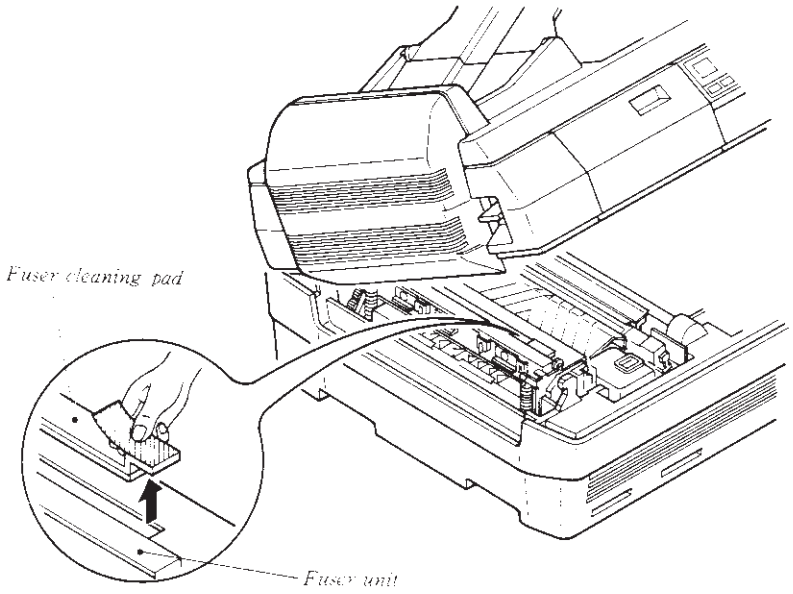


Figure 3.5 Replacing the Cleaning Pad

Caution

The fuser cleaning pad is hot immediately after the printer is used. Wait for it to cool before removing it.

5. Close the upper unit. Push it down slowly until it locks.

6. Open the hopper cover on top of the printer.

7. Tap lightly two or three times on top of the toner cartridge to knock off toner adhering to the sides. Then press open the cartridge stopper and lift the cartridge out, as in Figure 3.6.

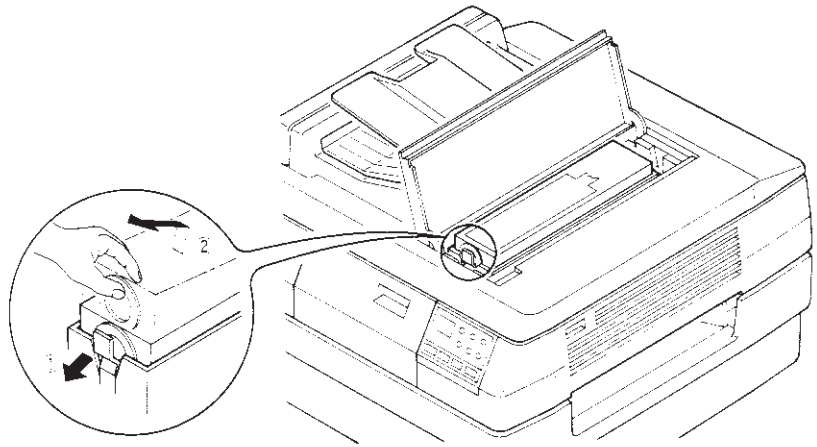


Figure 3.6 Removing the Toner Cartridge

8. Take the new toner cartridge from the toner kit. Give it a good shake to loosen and mix the toner inside.

Caution

Be careful not to damage the plastic sealing strip. Do not remove the sealing strip before installing the cartridge.

If the sealing strip is damaged or removed first, the cartridge cannot be installed.

9. Install the new toner cartridge. Fit the tabs at the far end of the cartridge into the slots at the rear of the developer unit, as shown in Figure 3.7. Lock the near end of the cartridge securely with the cartridge stopper.

   The cartridge cannot be installed backward. Do not try to force it in.

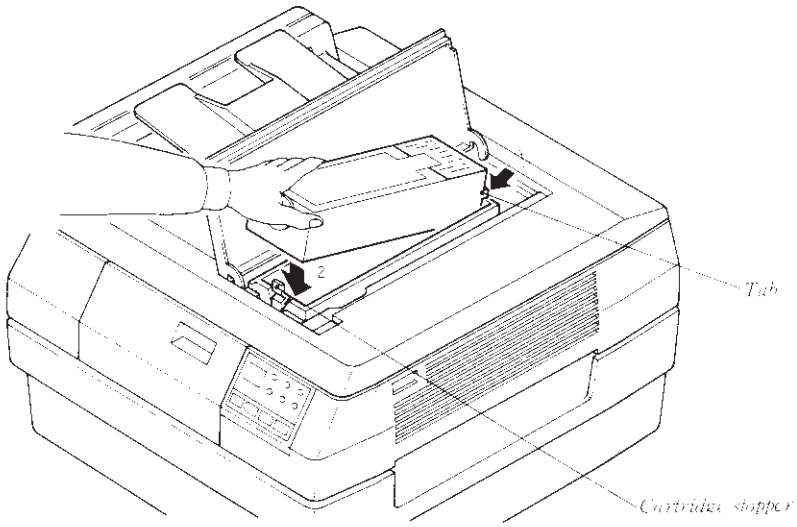


Figure 3.7 Installing the New Toner Cartridge

10. Free the end of the plastic sealing strip by tearing the end of the label on top of the cartridge. Then hold the cartridge down with one hand and pull the sealing strip straight up and off, as in Figure 3.8.

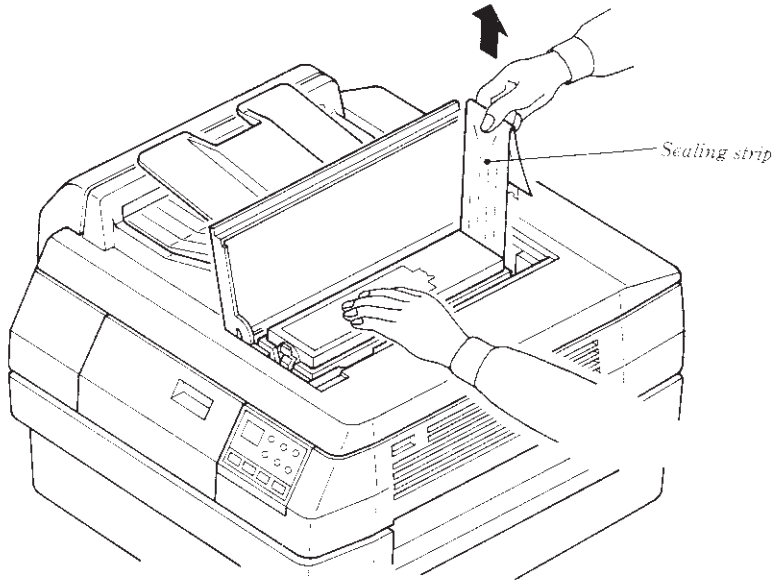


Figure 3.8 Removing the Sealing Strip

11. Close the hopper cover.

Note

If the toner indicator (∴) does not go off after the toner kit is replaced, take out the developer unit, tilt it forward (connector end down) about 45 degrees, shake it lightly to redistribute the toner, then replace it.

3.3 Drum Kit Replacement

Perform this procedure as soon as possible after the L I code is displayed.

Caution

To avoid print quality problems:

Handle the new drum cartridge with care. Do not touch the green surface of the drum. Avoid any type of impact on the cartridge.

Do not expose the new drum to sunlight or other strong light, or even to normal light for a long time. Five minutes in normal office lighting (500 lux) is the safe limit.

1. Obtain a new drum kit.
2. Switch printer power off.
3. Remove any paper or other objects lying on top of the printer.
4. Open the upper unit.
5. Open the front door (Figure 3.9).
6. Turn the drum cartridge lock lever 90 degrees to the right, as in Figure 3.10.
7. Carefully remove the drum cartridge. See Figure 3.11.

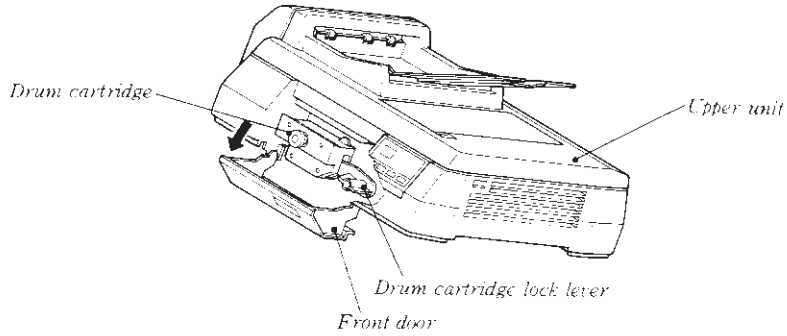


Figure 3.9 Front Door

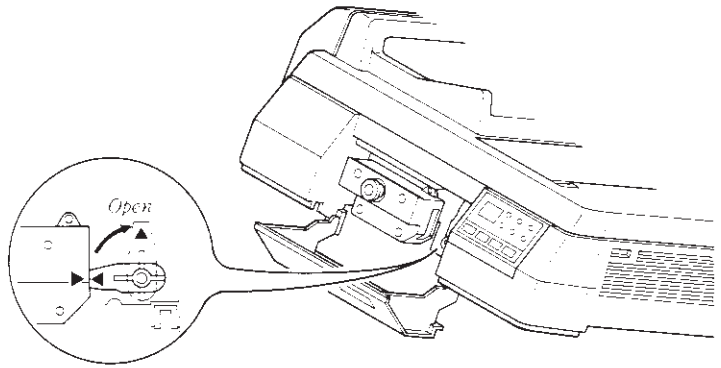


Figure 3.10 Unlocking the Drum Cartridge

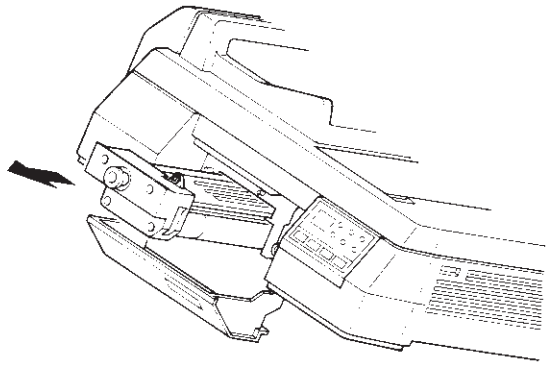


Figure 3.11 Removing the Drum Cartridge

8. Fit the TF cleaner onto the transfer charger as shown in Figure 3.12 and slide it back and forth several times to clean the transfer charger wire. Then wipe the paper chute (Figure 3.13) with the wiper in the drum kit.

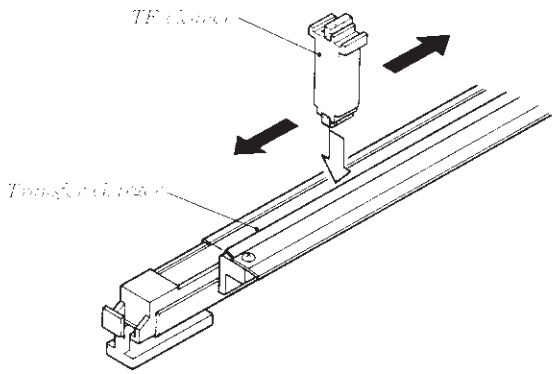


Figure 3.12 Cleaning the Transfer Charger

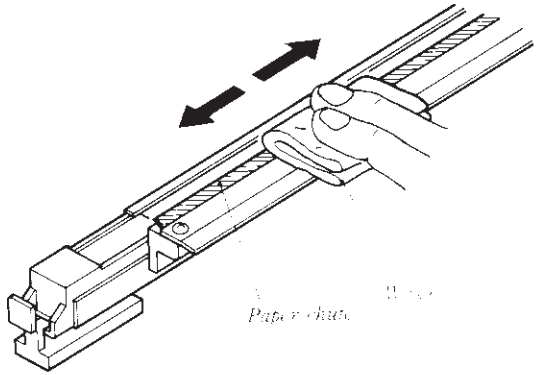


Figure 3.13 Cleaning the Paper Chute

Note

Use a new TF cleaner each time you install a new drum kit.

9. Clean the optical filter with the cotton swab as shown in Figure as shown in Figure 3.14.

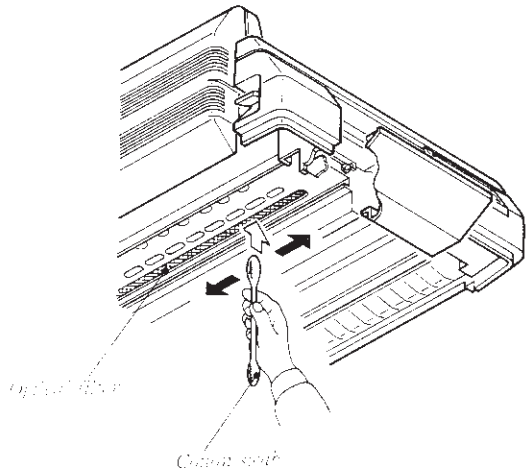


Figure 3.14 Cleaning the Filter

10. Take the new drum cartridge out of the kit.

Caution

Perform the next steps (11) and (12) carefully but promptly, remembering that the drum is sensitive to contact and light.

11. Remove the protective cover and spacer of the drum cartridge.

12. Set the drum cartridge on the two rails in the upper unit. (See Figure 3.15.) Check that it is seated correctly on the rails, then insert it slowly. Be careful that the front cover does not touch the drum surface.

Caution

When inserting the drum, be sure that no part of the printer touches the green drum surface.

Avoid impact. Impact can damage the drum cartridge.

Do not force the cartridge into the printer.

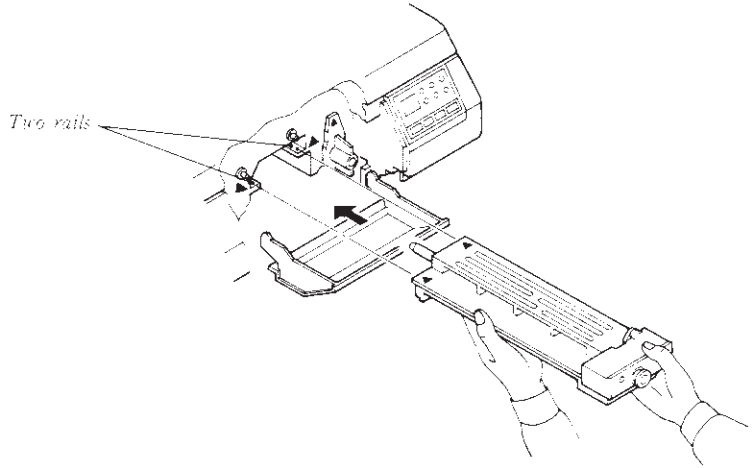


Figure 3.15 Inserting the New Drum Cartridge

13. Check that the drum cartridge is inserted all the way, then turn the locking lever 90 degrees to the left, so that the two triangular marks align. Make sure the cartridge is locked securely. (Figure 3.16)

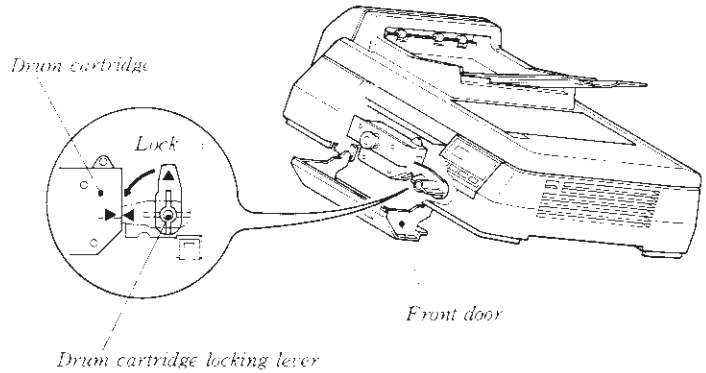


Figure 3.16 Locking the Drum Cartridge

Caution

Damage to the drum can result if the drum cartridge is not inserted all the way or not locked securely.

14. Shut the front door and close the upper unit.

15. Place the used drum cartridge in a plastic bag and dispose of it.

3.4 Developer Kit Replacement

When the L2 code is displayed, install a new developer kit and toner kit as soon as conveniently possible by the procedure below.

Caution

Do not leave floppy disks etc. lying around while performing this maintenance procedure. This procedure tends to raise a little toner dust, which can harm magnetic recording media.

1. Remove any paper or other objects lying on top of the printer.
2. Open the hopper cover on top of the printer.
3. Release the front and rear developer stoppers. See Figure 3.17.
4. Detach the connectors of the developer unit (connectors A and B in Figure 3.18)

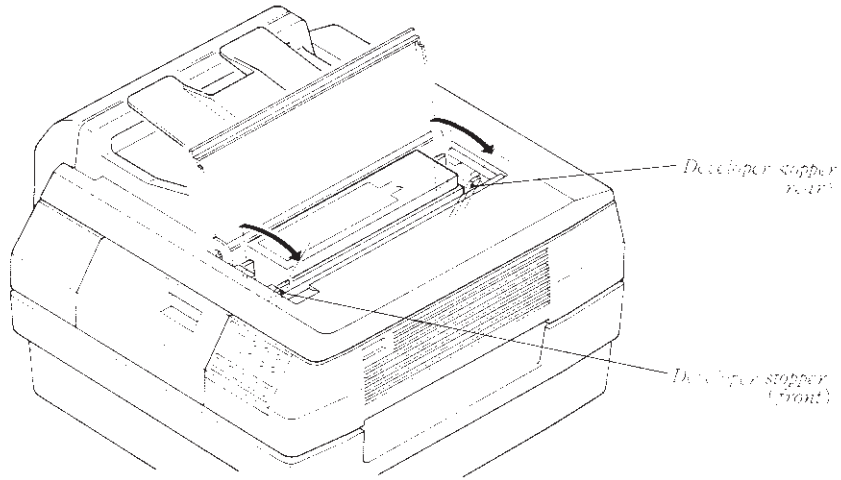


Figure 3.17 Releasing the Developer Stoppers

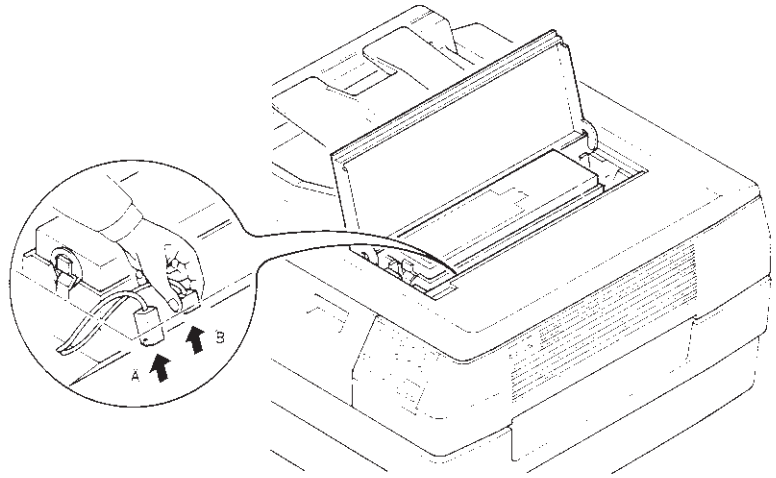


Figure 3.18 Detaching the Connectors

5. Raise the developer handle and lift the developer unit straight up and out. (Figure 3.19)

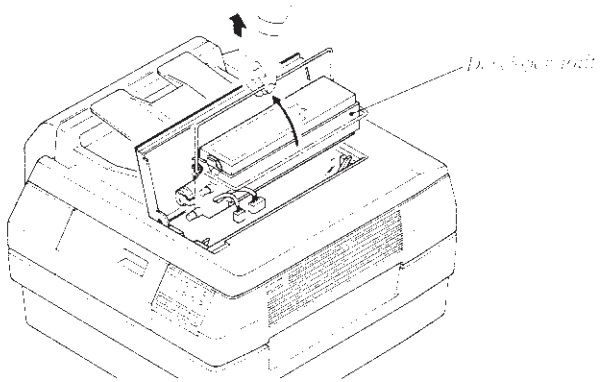


Figure 3.19 Removing the Developer Unit

6. Insert the new developer unit as shown in Figure 3.20. Insert it straight, making sure the developer rods fit into the guide slots on the upper unit.

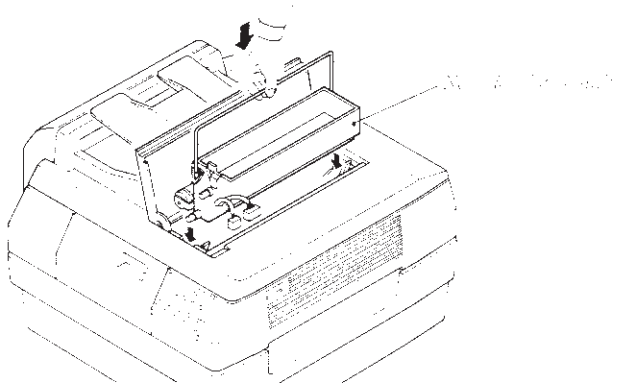


Figure 3.20 Installing the New Developer Unit

7. Close the front and rear stopper catches to lock the developer unit in place.

8. Plug in the connectors of the developer unit (connectors A and B in Figure 3.21).

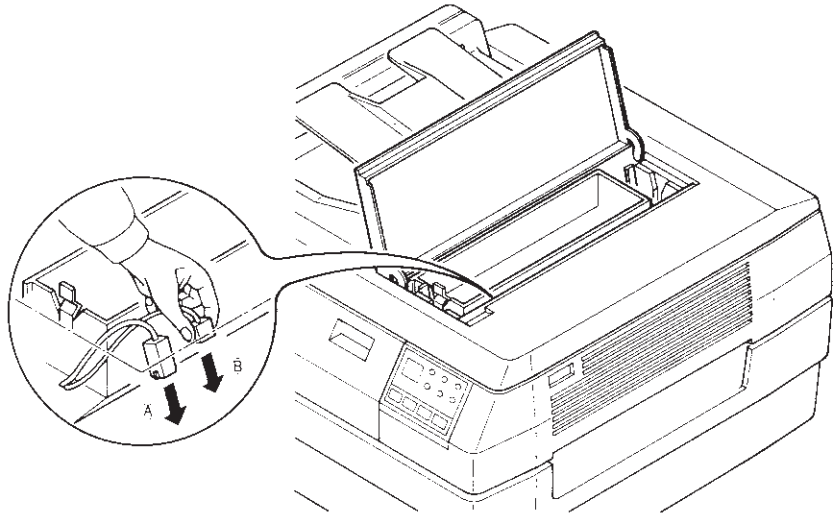


Figure 3.21 Plugging in the Connectors

9. Take the new toner cartridge from the toner kit. Give it a good shake to loosen and mix the toner inside.

Caution

Be careful not to break the seal. Do not remove the sealing strip before the toner cartridge is installed in the printer.

10. Insert the toner cartridge. Fit the tabs at the far end of the cartridge into the slots at the rear of the developer unit, and engage the near end of the cartridge with the cartridge stopper in the developer unit, as shown in Figure 3.22.

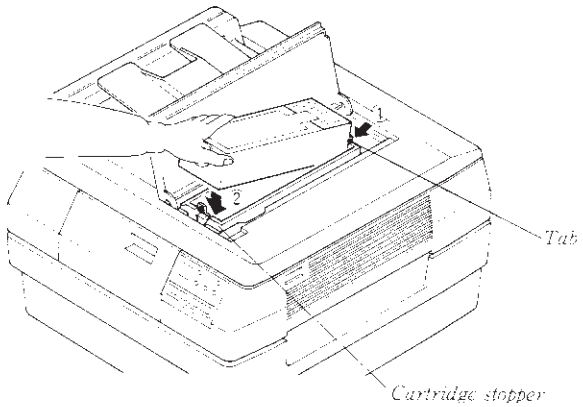


Figure 3.22 Installing the New Toner Cartridge

11. Check that the toner cartridge is locked in place by the cartridge stopper. Next free the end of the plastic sealing strip by tearing the end of the label on top of the cartridge (Figure 3.23).

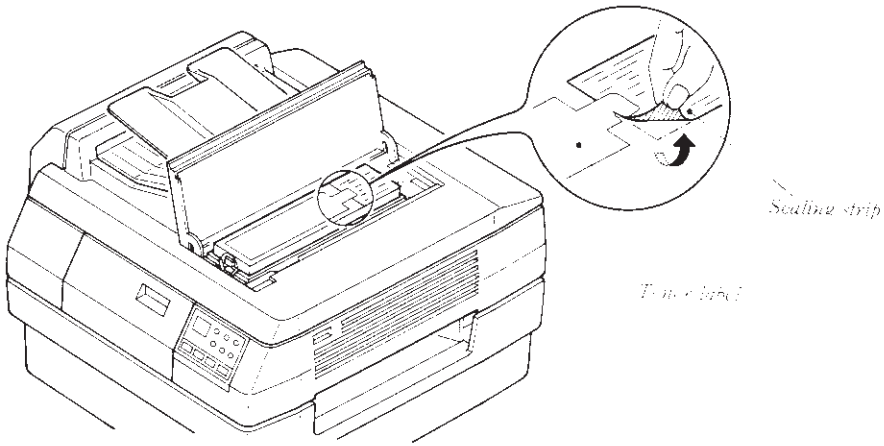


Figure 3.23 Freeing the End of the Sealing Strip

12. Hold the cartridge down with one hand and pull the sealing strip straight up and off, as in Figure 3.24.

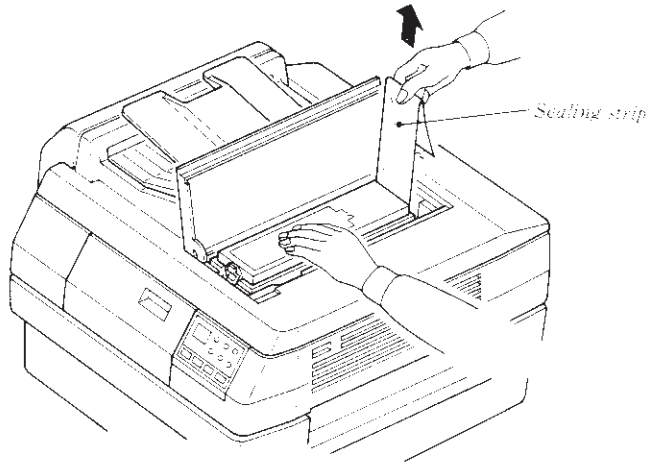


Figure 3.24 Removing the Sealing Strip

13. Close the hopper cover.

14. Open the upper unit.

Caution

Be careful not to touch the drum surface or expose it to strong light. The drum is extremely sensitive. Damage to its surface can impair print quality.

15. Remove the waste toner bottle from the lower unit as in Figure 3.25. Cap it with the cap in the new toner kit and dispose of it. Then install the new waste toner bottle in the lower unit.

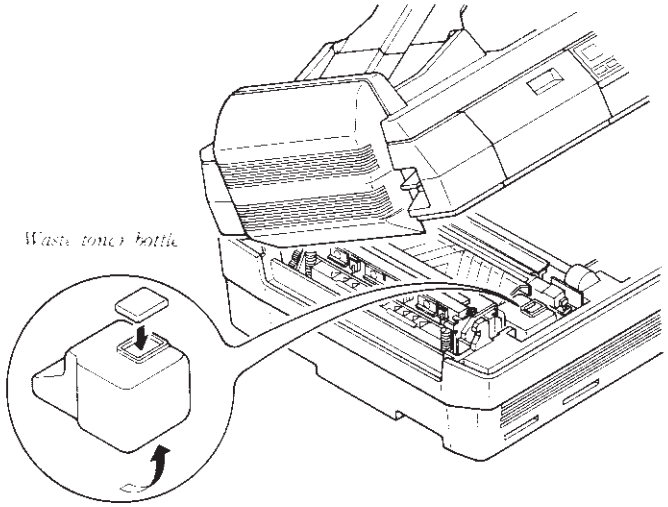


Figure 3.25 Replacing the Waste Toner Bottle

16. Replace the fuser cleaning pad.

    Remove the cleaning pad from the fuser as shown in Figure 3.26, then insert a new cleaning pad.

> **Caution**
>
> The fuser cleaning pad is hot immediately after the printer is used. Wait for it to cool before removing it.

17. Remove the transfer charger as shown in Figure 27. The transfer charger is held by catches at the front and rear. To remove it, first disengage the front catch (1), then pull the transfer charger forward (2) and lift (3). The lifting is best done with both hands. Be careful not to touch the drum.

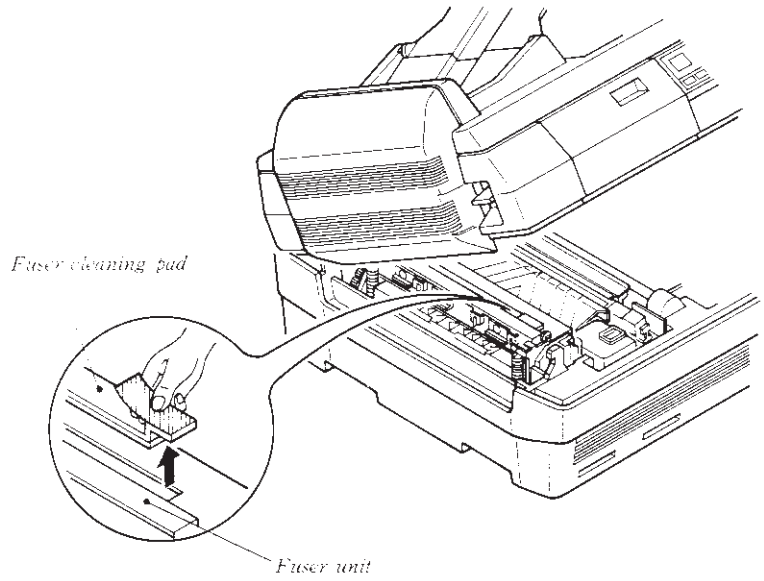


Figure 3.26 Replacing the Cleaning Pad

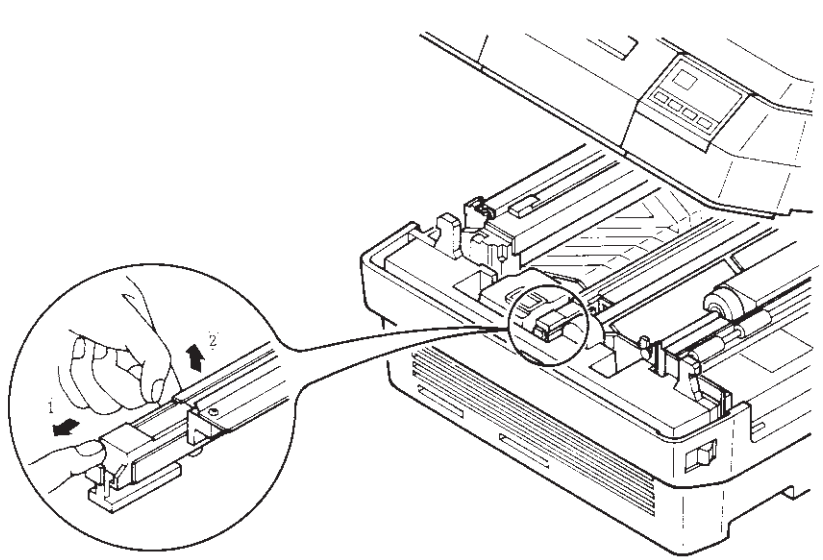


Figure 3.27 Removing the Transfer Charger

18. Install the new transfer charger. Fit the rear end into the hole at the back, then push the near end inward and down. Figure 3.28 shows the seating of the transfer charger.

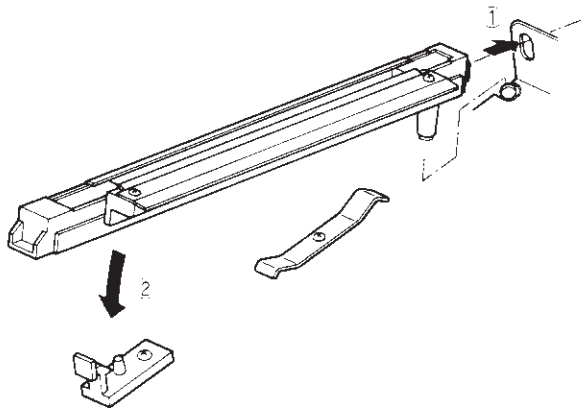


Figure 3.28 Installing the New Transfer Charger

19. Check that the new waste toner bottle, fuser cleaning pad, and transfer charger are correctly installed, then close the upper unit.

Note

If the toner indicator (∴) still comes on when power is turned on, take out the developer unit, tilt it forward (connector end down) about 45 degrees, shake it lightly to redistribute the toner, then replace it.

CHAPTER 4
TROUBLESHOOTING

This chapter explains how to handle any problems that may arise with the printer. The procedures are easy to follow. Follow them carefully, and if they fail to fix the problem, call for serviceman assistance.

Section 4.1 is a general guide to the troubleshooting procedures, which are given in detail in Sections 4.2 to 4.6.

4.1 General Guide

If the printer does not print:

Is the ready indicator (○) lit?

- If the ready indicator is not lit, you have a power problem. See Section 4.2.
- If the ready indicator is on, proceed as for an abnormal printing problem. See below.

If the printing is abnormal:

Set the printer off-line, then press the STATUS key to print a status page.

- If the result is normal, you have an interface problem. See Section 4.3.
- If the result is not normal, you have a print quality problem. See Section 4.4.

If a control panel indicator is lit or a code other than 00 or dP is displayed:

- See Section 4.5. (For a paper jam, see Section 4.6.)

4.2 Power Problems

If nothing happens when you switch the printer's power on, you have a power problem. The symptoms are a dark control panel, no printing, and no fan sound. Proceed as follows.

Check the power switch.

The on position is marked **ON** and **I**.

The off position is marked **OFF** and **O**.

Check the power cord.

If the cord is loose at either end, switch power off, plug the power cord in securely, then switch power on again.

Call for serviceman assistance.

If the above checks do not solve the problem, call for serviceman assistance.

4.3 Interface Problems

If the printer prints a status page correctly but does not print data from the computer correctly (or at all), there is an interface problem.

Check the interface cable.

Make sure the cable is plugged in securely at both ends.

Check your file and software.

Try printing a different file, or using a different print command.

If you are using an RS-232C cable, reset the RS-232C parameters.

On the printer, press the MANUAL FEED key and hold it down, then also press the ON LINE key. This resets the printer's RS-232C parameters to:

Baud rate	9600 bits per second	(H1 =96 on the status page)
Data length	8 bits per character	(H2 = 8 on the status page)
Stop bits	1	(H3 = 1 on the status page)
Parity	None	(H4 = 0 on the status page)
Protocol	XON/XOFF, DTR (positive logic), and ETX/ACK	(H5 = 0 on the status page)

Set the computer's RS-232C parameters to the same values. The printer and computer should then be able to communicate.

Try using a different cable.

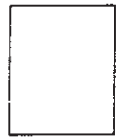
Compare the pin assignments listed in Appendix D with the specifications of your cable.

Call for serviceman assistance.

If the above checks do not solve the problem, call for serviceman assistance.

4.4 Print Quality Problems

Print quality problems range from uneven tone to completely blank output. The troubleshooting procedure for each type of problem is given below.



Completely blank printout

Check the toner indicator.

If the toner ( ) indicator is lit, install a new toner kit.
See Section 3.2.

Check the drum cartridge.

Open the upper unit, then open the front door and check that the drum cartridge is inserted straight and all the way in, and that the lock lever is turned down so the two triangular marks are aligned.

Check the developer unit.

Open the hopper cover and check that the developer unit is properly installed, with both of its connectors connected.

Call for serviceman assistance.

If the above checks do not solve the problem, call for serviceman assistance.

All-black printout

Call for serviceman assistance.

Dropouts, horizontal black streaks, stray dots

Note the spacing of the defects.

- If the defects occur at regular intervals of 94 mm (3.7 inches), the problem is a damaged drum. Install a new drum kit. See Section 3.3.
- If the defects occur at irregular positions, try cleaning the transfer charger wire with the TF cleaner (supplied in the drum kit). Also clean the metal ramp to the left of the transfer charger.

Call for serviceman assistance.

If the above checks do not solve the problem, call for serviceman assistance.

White or black vertical streaks

Check the control panel.

- If the toner indicator (∴) is lit, install a new toner kit. See Section 3.2.
- If the L1 or L2 code is displayed, install a new drum kit or developer kit. See Sections 3.3 and 3.4.
- If the L3 code is displayed, call a serviceman to have the fuser unit replaced.

Clean the main charger wire.

Open the upper unit, open the front door, and pull the orange main charger wire cleaner knob slowly in and out a few times.

Check the drum.

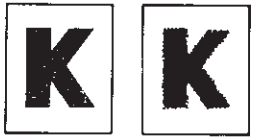
If the drum is scratched, install a new drum kit. See Section 3.3.

Check the optical filter.

If the optical filter is dirty, clean it with a cotton swab.

Call for serviceman assistance.

If the above checks do not solve the problem, call for serviceman assistance.



Faint or blurred printing

Check the control panel.

- If the toner indicator (∴) is lit, install a new toner kit. See Section 3.2.
- If the L1 or L2 code is displayed, install a new drum kit or developer kit. See Sections 3.3 and 3.4.
- If the L3 code is displayed, call a serviceman to have the fuser unit replaced.

Check the developer unit.

Open the hopper cover and check that the developer unit is properly installed, with both of its connectors connected.

Check the transfer charger.

Open the upper unit and check the transfer charger.

- If it is dirty, clean it with the TF cleaner in the drum kit.
- If the charger wire is broken, call for serviceman assistance.

Was the drum exposed to strong light for a long time?

If so, install a new drum kit. See Section 3.3.

Call for serviceman assistance.

If the above checks do not solve the problem, call for serviceman assistance.

Grey background

- If the toner indicator (∴) is lit, install a new toner kit. See Section 3.2.
- If the L1 or L2 code is displayed, install a new drum kit or developer kit. See Sections 3.3 and 3.4.
- If the L3 code is displayed, call a serviceman to have the fuser unit replaced.

Check the developer unit.

Open the hopper cover and check that the developer unit is properly installed, with both of its connectors connected.

Was the drum exposed to strong light for a long time?

If so, install a new drum kit. See Section 3.3.

Call for serviceman assistance.

If the above checks do not solve the problem, call for serviceman assistance.

Dirt on the back of the paper

Check the transfer charger, paper chute, and ramp.

Open the upper unit and check for dirt on the transfer charger, paper chute, and ramp. Clean as necessary, using the wiper supplied in the drum kit or a soft, dry, lint-free cloth.

Call for serviceman assistance.

If the above checks do not solve the problem, call for serviceman assistance.

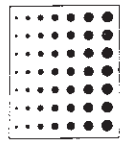
Characters out of position

Check the file or program

See if the problem is caused by incorrect PRESCRIBE commands. If the problem occurs with only one file or program, the most likely cause is a command error.

Call for serviceman assistance.

If the above checks do not solve the problem, call for serviceman assistance.



Uneven printing (darker on the right side than on the left side)

Redistribute the toner.

> **Caution**
>
> This procedure tends to raise a little toner dust. Carry the developer unit carefully away from the computer, floppy disks, and other sensitive equipment.
>
> Do not remove the toner cartridge from the developer unit.

1. Open the hopper cover, unplug the two connectors inside, and remove the entire developer unit by its handle.
2. Holding the developer unit in both hands, tilt it forward (near end down) and shake it gently to redistribute the toner inside.
3. Replace the developer unit and plug in the two connectors again.

4.5 Indicators and Codes

The tables on these two pages indicate how to respond to problems indicated by the control panel indicators and codes.

Symbolic Indicators

Indicator	Corrective action
Ready indicator	If the ready indicator does not come on even though power is on: • Check the other control panel indicators and code display and handle any problems as described below. • Try turning power off, then on again. • Call for serviceman assistance.
Paper indicator	Add paper to the cassette, or add a sheet of paper to the manual feed tray.
Paper jam indicator	Open the printer and correct the paper jam. See Section 4.6.
Toner indicator	Install a new toner kit. See Section 3.2.

Table 4.1 Symbolic Indicators

Codes

Code	Corrective action
01	Close the upper unit tightly
02	Close the face-down unit cover.
03	Close the hopper cover
L1	Install a new drum kit. See Section 3.2.
L2	Install a new developer kit. See Section 3.3.
L3	Call a service man to have the fuser unit replaced.
C1	Install a new toner kit. The printer will not operate until toner is added. *Note: The toner kit should be replaced at the first opportunity after the toner indicator lights, before the C1 code is displayed.*
En n = 1, 2, ...	Mechanical error: call a serviceman. *Note: The printer does not operate when a code beginning with E is displayed.*
Fn n = 1, 2, ...	Controller error: call a serviceman. *Note: The printer does not operate when a code beginning with F is displayed.*

Table 4.2 Error and Maintenance Codes

4.6 Correcting a Paper Jam

The paper jam indicator (⚠) flashes when paper becomes stuck in the paper transport system, the paper feed timing is incorrect, or paper fails to feed at all. The jam can be corrected by removing the paper. To turn off the jam indicator, you must also open and close the upper unit, even if no paper is jammed inside.

After the jam is corrected and the upper unit is closed again, the printer continues printing normally.

Caution

Always remove jammed paper by pulling it in its normal direction of travel. Never pull paper backwards.

Pulling paper backwards can damage sensor arms in the printer.

Check the paper tray.

If paper is partially fed out into the tray, pull the paper out the rest of the way by hand, then open and close the upper unit.

Check the face-down unit.

Open the face-down cover. If paper is caught inside, remove it as in Figure A, then open and close the upper unit.

The face-down unit is secured to the upper unit with the two catches. To open the face-down unit, gently press the catches and pull the face-down unit down.

Open the upper unit.

Close the face-down unit, open the upper unit, and check inside.

Caution

The fuser is hot. Do not touch it.

Be careful not to touch the drum surface.

If paper is jammed in the fuser, pull it out slowly as in Figure B.

Otherwise, remove the paper as in Figure C.

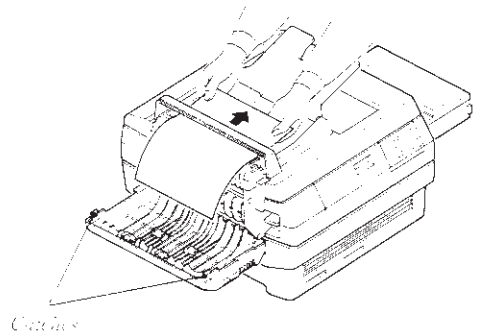


Figure A

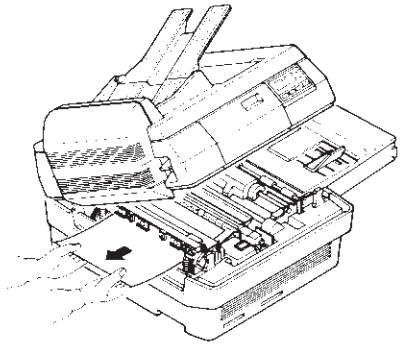


Figure B

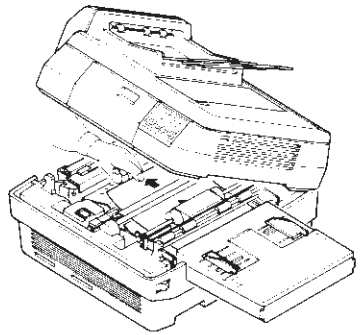


Figure C

APPENDIX A

HOW THE LASER PRINTER WORKS

A How the Laser Printer Works

This section is optional reading, for those interested in knowing how the printer works. You will not need this information in order to operate the printer.

There are three main steps in printing a page:

(1) **Receive and process the data**

(2) **Write the image on the drum**

(3) **Transfer the image from the drum to the paper**

Step (1), receiving and processing the data, is performed on the main logic board in the lower unit. From the data sent by the computer, the printer constructs a bit map indicating whether each dot on the page is to be printed black or left white. This bit map is stored, a strip at a time, in the printer's raster memory.

Step (2), writing the image on the drum, is performed by the optical system, drum cartridge, and developer in the upper unit. As the drum turns, first its surface is given a uniform electrical charge by a corona discharge from the main charger wire, which runs parallel to the length of the drum. Next a beam of laser light, bouncing off a rotating polygonal mirror, scans across the drum. The laser is switched on for each black dot and off for each white dot under control of the bit map in the printer's raster memory.

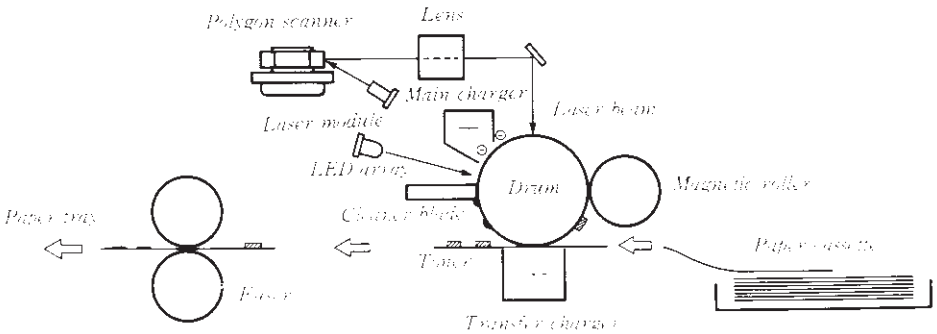
The drum is photosensitive: it conducts electricity when illuminated by light. Wherever it is illuminated by the laser beam, the charge on its surface escapes to ground level through the drum shaft. After scanning, the drum carries an invisible electrical image: the areas to be left white retain their electric charge, while the areas to be printed black are electrically neutral.

The invisible image is now developed by applying toner to the drum. The toner is carried to the drum by a magnetic roller, and adheres to

the electrically neutral areas to be printed black. The charge on the drum prevents toner from adhering to the areas to be left white.

Step (3), transferring the image to the paper, is performed by the transfer charger and fuser in the printer's lower unit. In the transfer charger, the paper is electrically charged by a corona discharge from the transfer charger wire. This charge attracts the toner particles from the drum to the paper. The paper is then passed between a heat roller and pressure roller, and heat from the heat roller fuses the toner permanently onto the paper.

Steps (2) and (3) are performed continuously as the drum rotates and the paper feeds through the printer. During the process, toner that fails to transfer to the paper is routed into the waste toner bottle. At the end, cleaning pads remove any toner remaining on the heat roller and photosensitive drum, and an LED array illuminates the drum to remove its remaining electric charge and prepare for the next image.



APPENDIX B

PRINTER SPECIFICATIONS

PRINTER SPECIFICATIONS

Item	Description
Printing method	Electrophotography, laser scan
Printing speed	10 pages/minute (A4 or letter-size paper, when printing multiple copies of the same page)
Resolution	300 dots/inch (vertical and horizontal)
First print	Approx. 20 seconds (A4 or letter-size), depends on input data
Warm-up time	40 seconds or less (at 20°C)
Controller	16-bit microprocessor
Main memory	F-1000/F-1000A : 512K bytes (standard) + 1M bytes (option) F-1000+ : 1.5M bytes (standard)
Raster memory	F-1000(220/240V) : 512K bytes F-1000(100V)/F-1000A/F-1000+ : 128K bytes
IC card slots	Two
Self test	Performed at power-up
Scanning system	Semiconductor laser, polygon mirror
Drum	Organic photoconductive drum
Developer	Mono-component dry developer
Main charger	Scorotron charger
Transfer charger	Corotron charger
Separation	Curvature separation
Drum cleaning	Blade cleaner
Drum discharging	Illumination by LED array
Fuser	Heat roller and pressure roller
Paper	Plain paper. See Appendix C.
Cassettes	Letter-size, legal-size, A4, B5 Each cassette holds 250 sheets of weight 60 to 90 g/m^2, thickness 0.1 mm or less
Manual paper feed	By panel key or command.
Capacity of tray	150 pages
Ambient conditions	Temperature: 10°C to 32.5°C (50°F to 90.5°F) Humidity: 20% to 80% RH Optimum conditions: 20°C, 65% RH Altitude: Max. 2000 m (6500 feet) Illumination: Max. 1500 lux
Power requirements	100V, 50/60 Hz, Max. 8.5 A, or 120 V, 60 Hz, Max.7 A, or 220—240 V, 50 Hz, Max. 3.5 A Max. allowable voltage fluctuation: ±10% Max. allowable frequency fluctuation: ±2%
Power consumption	Max. 950 W

PRINTER SPECIFICATIONS

Item	Description
Noise	Max. 55 dB(A) when printing (Excl. peak values) Max. 45 dB(A) when idling (Excl. peak values) (Measured 1 m from the outside of the printer)
Dimensions	320 mm high x 428 mm wide x 450 mm deep (Excluding cassette, connectors, and tray)
Weight	26 kg (main unit only)

APPENDIX C

PAPER SELECTION

C.1 General Guidelines

The laser printer is designed to print on high-quality copier bond paper (the kind used in ordinary dry copier machines), but it can accept a variety of other types of paper as well within the limits specified below.

Caution

The manufacturer assumes no liability for problems that occur when paper not satisfying these requirements is used.

Selection of the right paper is important. The wrong paper can result in jams, misfeeds, curl, poor print quality, and paper waste, and in extreme cases can damage the printer. The guidelines given below will increase the productivity of your office by ensuring efficient, trouble-free printing and reducing wear and tear on the printer.

Paper Availability

Most types of paper are compatible with a variety of machines. Paper intended for xerographic copiers and small offset duplicators can also be used with the laser printer.

There are three general grades of paper: economy, standard, and premium. The greatest difference between grades is in their whiteness, which is affected by additives to the paper. Whiter paper is more expensive. The whiter the paper you use the higher the level of quality your printed output will reflect.

There are also subtle physical differences between grades of paper from different suppliers. These differences can affect the performance of the paper in the printer. With the wrong paper even the best of printers will produce inferior results. An economy grade of paper is not economical in the long run if it causes printing problems.

Paper in each grade is available in a range of basis weights (defined later). The traditional standard weights are 16, 20, and 24 pounds.

Paper Specifications

The following table summarizes the basic paper specifications. Details are given on the following pages.

Item	Specification
Weight	60 to 90 g/m² (16 to 24 lbs/ream)
Thickness	0.086 to 0.110 mm (3.4 to 4.3 mils)
Dimensional accuracy	±0.7 mm (±0.0276 inches)
Squareness of corners	90° ±0.2°
Moisture content	4% to 6%
Direction of grain	Long grain
Pulp content	80% or more

Table 1 Specifications for White Bond Paper

C.2 Selecting the Right Paper

Laser printing is a process involving laser light, electrostatic discharge, toner, and heat. In addition, as the paper passes through the printer it undergoes considerable sliding, bending, and twisting motions. A high-quality printing paper matching the laser printer's requirements withstands all these stresses, enabling the printer to turn out clean, crisp printed copy consistently.

Remember that all paper is *not* the same. Some of the factors to consider when selecting paper for the laser printer are as follows:

Condition of the Paper

Avoid using paper that is bent at the edges, curled, dirty, torn, or contaminated with lint, clay, or paper shreds

Use of paper in these conditions can lead to illegible printing, misfeeding, and paper jams, and can shorten the life of the printer. In particular, avoid using paper with a surface coating or other surface treatment. The paper should have as smooth and even a surface as possible.

Composition

Do not use paper that has been coated or surface-treated and contains plastic or carbon, like the paper on which the printer's Quick Reference manual is printed. The heat of fusing can cause such paper to give off harmful fumes.

Bond paper should contain at least 80% pulp. Not more than 20% of the the total paper content should consist of cotton or other fibers.

Paper Size

Cassettes are available for the paper sizes listed in Table 2. The dimensional tolerances are 0.7 mm (0.0276 inches) for the length and width. The angle at the corners must be 90° ±0.2°.

Cassette	Letter	Legal	ISO A4	JIS B5
Size	8.5 x 11 in	8.5 x 14 in	210 x 297 mm	182 x 257 mm

Table 2 Paper Sizes for Cassette Paper Feed

Other sizes of paper can be fed manually. The minimum size of manually fed paper is 100 x 148 mm (4.0 x 5.8 inches), fed lengthwise. The maximum size is 216 x 356 mm (8.5 x 14 inches).

The printer automatically recognizes cassette paper sizes, but regards all manually fed paper as having the maximum size of 8.5 x 14 inches.

Smoothness

The paper should have a smooth, uncoated surface. Paper with a rough or sandy surface can cause voids in the printed output. Paper that is too smooth, however, can cause multiple feeding and fogging problems. (Fogging is a gray background effect.)

Basis Weight

Basis weight is the weight of a standard quantity of paper. In the traditional system the standard quantity is a ream consisting of 500 sheets measuring 17 x 22 inches each. In the metric system the standard quantity is 1 square meter.

Paper that is too light or too heavy can cause misfeeding, jams, and premature wear of the printer. Uneven paper weight can cause multiple feeds, print defects, poor toner fusing, blurring, and other print quality problems. The proper weight is:

Weight	60 to 90 g/m^2 (16 to 24 lbs/ream)

Thickness (Caliper)

Thick paper is referred to as high-caliper paper and thin paper as low-caliper paper. The paper used with the laser printer should be neither extremely thick nor extremely thin. If you are having problems with paper jams, multiple feeds, and faint printing, the paper may be too thin. If you are having problems with paper jams and blurred printing the paper may be too thick. The proper thickness is:

Thickness	0.086 to 0.110 mm (3.4 to 4.3 mils)

Moisture Content

Moisture content is defined as the percent ratio of moisture to the dry mass of the paper. Moisture can affect the paper's appearance, feedability, curl, electrostatic properties, and toner fusing characteristics.

The moisture content of the paper varies with the relative humidity in the room. When the relative humidity is high and the paper absorbs moisture, the paper edges expand, becoming wavy in appearance. When the relative humidity is low and the paper loses moisture, the edges shrink and tighten, and print contrast may suffer.

Wavy or tight edges can cause misfeeding and alignment anomalies. The moisture content of the paper should be:

Moisture content	4% to 6%

To ensure the proper moisture content it is important to store the paper in a controlled environment. Some tips on moisture control are:

- Store paper in a cool, dry location.
- Keep the paper in its wrapping as long as possible. Rewrap paper that is not in use.
- Store paper in its original carton. Place a pallet etc. under the carton to separate it from the floor.
- After removing paper from storage, let it stand in the same room as the printer for 48 hours before use.
- Avoid leaving paper where it is exposed to heat, sunlight, or damp.

Paper Grain

When paper is manufactured, it is cut into sheets with the grain running parallel to the length (long grain) or parallel to the width (short grain). Short grain paper can cause feeding problems in the printer. All paper used in the printer should be long grain.

Direction of grain	Long grain

Other Paper Properties

Porosity: Refers to the density of the paper structure; that is, to how openly or compactly the fibers are bonded.

Stiffness: Limp paper can buckle inside the printer, while paper that is too stiff may bind. Either way the result is a paper jam.

Curl: Most paper has a natural tendency to curl in one direction. The paper should be loaded so that the natural curl is downward, to counteract the upward curl imparted by the printer. Printed sheets will then come out flat. Most paper also has a top and bottom surface. Loading instructions are usually given on the paper package.

Electrostatic properties: During the printing process the paper is electrostatically charged to attract the toner. The paper must be able to release this charge so that printed sheets do not cling together in the output tray.

Whiteness: The contrast of the printed page depends on the whiteness of the paper. Whiter paper provides a sharper, brighter appearance.

Quality control: Uneven sheet size, corners that are not square, ragged edges, welded (uncut) sheets, and crushed edges and corners can cause the printer to malfunction in various ways. A quality paper supplier should take considerable care to ensure that these problems do not occur.

Packaging: Paper should be packed in a sturdy carton to protect it from damage during transport. Quality paper obtained from a reputable supplier is usually properly packaged.

C.3 Special Paper

The following types of special paper can be used:

- Overhead projection (OHP) film
- Adhesive-backed label paper
- Envelopes
- Colored paper
- Preprinted paper

Use paper that is sold specifically for use with copiers (heat-fusing type). OHP film, label paper, and envelopes should not be placed in the cassette; they must be fed manually.

Since the composition and quality of special paper vary considerably, special paper is more likely than white bond paper to give trouble during printing. No liability will be assumed if moisture etc. given off in printing on special paper causes harm to the machine or operator.

Note

Before purchasing any type of special paper, test a sample on the printer and check that printing quality is satisfactory.

Specifications for each type of special paper are given below.

Overhead Projection (OHP) Film

The following types of OHP film are recommended:

- 3M Type-686
- FOLEX X-100

OHP film must be able to withstand the heat of fusing during the printing process. It should satisfy the conditions in Table 3.

Item	Specification
Tolerance of heat	Must tolerate at least 190°C (374°F)
Thickness	0.100 to 0.110 mm (3.9 to 4.3 mils)
Dimensional accuracy	±0.7 mm (±0.0276 in)
Squareness of corners	90° ±0.2°

Table 3 OHP Film Specifications

Adhesive-Backed Labels

The basic rule for printing on adhesive labels is that the adhesive must never come into contact with any part of the printer. Adhesive paper sticking to the drum or rollers will damage the printer.

Label paper must be manually fed.

Label paper has a structure consisting of three layers, as shown in Figure 1. The top sheet is printed on. The adhesive layer consists of pressure-sensitive adhesives. The carrier sheet (also called the linear or backing sheet) holds the labels until use. Due to the complexity of its composition, adhesive-backed label paper is particularly likely to give trouble in printing.

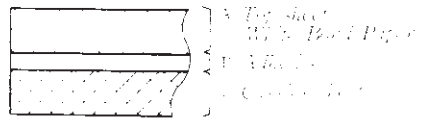


Figure 1 Adhesive-Backed Label

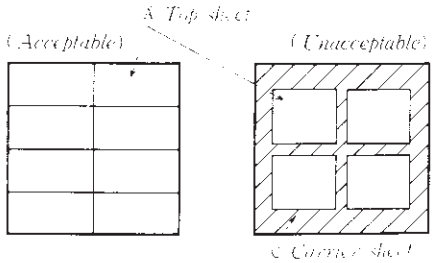


Figure 2 Label Arrangement

Adhesive label paper must be entirely covered by its top sheet, with no spaces between the individual labels. Labels with spaces in between are apt to peel off, causing serious jam problems.

Some label paper is manufactured with an extra margin of top sheet around the edge. Do not remove the extra top sheet from the carrier sheet until after printing is finished.

Table 4 lists the specifications for adhesive label paper.

Item	Specification
Weight of top sheet	44 to 74 g/m² (12 to 20 lbs/ream)
Composite weight	104 to 151 g/m² (28 to 40 lbs/ream)
Thickness of top sheet	0.086 to 0.107 mm (3.9 to 4.2 mils)
Composite thickness	0.115 to 0.145 mm (4.5 to 5.7 mils)
Moisture content	4% to 6% (composite)

Table 4 Adhesive Label Specifications

Envelopes

The printer can print on envelopes using paper with a basis weight of 60 to 79 g/m² (16 to 21 lbs/ream). Envelopes must be manually fed.

An envelope is a more complex object than a single sheet of paper. For this reason, it may not be possible to obtain consistent printing quality over the entire envelope surface.

Many envelopes have a diagonal grain orientation. (See **Paper Grain** above.) This orientation is more likely to wrinkle and crease on its way through the printer. Before purchasing envelopes for use with the printer, test a sample to verify the envelope's suitability.

Do not use envelopes having an encapsulated liquid adhesive.

Avoid long printing runs consisting of envelopes only. Extensive envelope printing can cause premature printer wear.

Colored Paper

Colored paper should satisfy the same conditions as white bond paper, listed in Table 1. In addition, the pigments used in the paper must be able to withstand the heat of fusing during the printing process (up to 190°C or 374°F).

Preprinted Paper

Preprinted paper should have a bond paper base. The preprinted ink must be able to withstand the heat of fusing during the printing process, and must not be affected by silicone oil.

Do not use paper with any kind of surface treatment, such as the type of paper commonly used for calendars.

APPENDIX D

HOST COMPUTER INTERFACE

This appendix describes the signals used in the laser printer's parallel and RS-232C interfaces. It lists pin assignments, signal functions, timings, connector specifications, and voltage levels. The RS-232C protocols are also covered.

D.1 Parallel Interface

Interface Signals

The laser printer has a Centronics-type parallel interface. The pins of the parallel interface connector carry the signals listed in Table 1. Asterisks in the table indicate signals that are active low. The table also indicates whether each signal is incoming or outgoing with respect to the printer.

Pin	In/out	Description	Pin	In/out	Description
1	In	Strobe*	19	--	Ground Return
2	In	Data 0	20	--	Ground Return
3	In	Data 1	21	--	Ground Return
4	In	Data 2	22	--	Ground Return
5	In	Data 3	23	--	Ground Return
6	In	Data 4	24	--	Ground Return
7	In	Data 5	25	--	Ground Return
8	In	Data 6	26	--	Ground Return
9	In	Data 7	27	--	Ground Return
10	Out	Acknowledge*	28	--	Ground Return
11	Out	Busy	29	--	Ground Return
12	Out	Not output	30	--	Ground Return
13	Out	On-Line (Select)	31	In	Ignored
14	In	Ignored	32	Out	Not output
15	--	Not connected	33	--	Not connected
16	--	Not connected	34	--	Not connected
17	--	Not connected	35	Out	Power Ready
18	--	Not connected	36	In	Ignored

Table 1 Parallel Connector Pin Assignments

Detailed descriptions of the signals follow.

Strobe* (Pin 1)

A negative-going Strobe* pulse causes the printer to read and latch the data on the Data 0 to Data 7 signal lines.

Data 0 to Data 7 (Pins 2 to 9)

These eight signals form the data byte sent from the host computer to the printer. Data 7 is the most significant bit.

Acknowledge* (Pin 10)

This negative-going pulse acknowledges the previous character received by the printer. Acknowledge* pulses are sent only when Busy is low.

Busy (Pin 11)

This signal is high when the printer is busy and low when it is able to accept more data. Every high-to-low transition is followed by an Acknowledge* pulse.

Paper Error (Pin 12)

This signal line is not used.

On-Line (Pin 13)

This signal is high whenever the printer's power is on. It does not go low when the ON LINE key is pressed.

Auto-Feed (Pin 14)

This signal is used in the Epson FX-80 version of the Centronics interface to receive a carriage return. It is ignored by the laser printer.

Prime (Pin 31)

This signal is used in the standard Centronics interface to enable the computer to reset the printer. It is ignored by the laser printer.

Fault (Pin 32)

This signal line is not used.

Power Ready (Pin 35)

This signal is high when the printer's power is on.

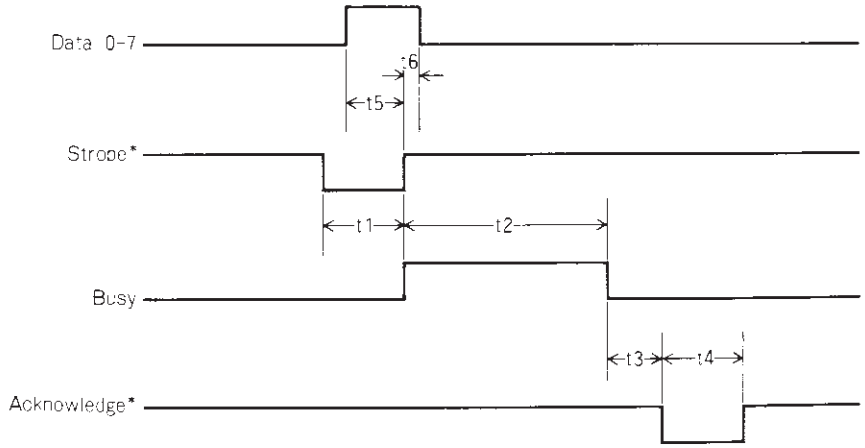
Select In (Pin 36)

This signal is used in some versions of the Centronics interface to enable the computer to force the printer on-line. It is ignored by the laser printer.

Parallel Interface Theory of Operation

The computer sends the printer one byte at a time, by placing the data on the Data lines and sending a Strobe* pulse. When the printer detects the positive transition of the Strobe* signal, it latches the data and asserts the Busy signal. Then the printer reads the data into its input buffer and starts processing it. The Busy signal remains high until the buffer is ready to accept more data. Any Strobe* pulses arriving while Busy is high are ignored. When the printer is ready for more data, it makes Busy low and sends a negative Acknowledge* pulse, then waits for the next Strobe*.

Parallel Interface Timing Diagram



Interval	Min.	Max.	Description
t1	0.5	--	Strobe* pulse width
t2	100	300	Strobe* high to Busy low
t3	4	100	Busy low to Acknowledge* low
t4	4	100	Acknowledge* pulse width
t5	0.4	--	Data setup time, to Strobe* high
t6	0.4	--	Data hold time, from Strobe* high

Note: All times are in microseconds.

Table 2 Parallel Interface Timing

When the printer's input buffer is full, time t2 can be indefinitely long. The printer's microprocessor holds Busy high for as long as it takes to process the data in the input buffer.

Parallel Connector

The connector marked **Parallel** on the rear panel is an Amphenol 57-40360 with a quick-release wire bail lock. The mating connector on the cable should be an Amphenol 57-30360 or equivalent.

Parallel Interface Signal Levels

All input signals except Strobe* are alike, with a 1000-ohm pull-up to +5 volts. The receiver is a custom gate-array chip. Any input voltage above 2.2 volts is considered high. Any input voltage below 0.8 volts is considered low.

The Strobe* signal has a 1000-ohm pull-up resistor, paralleled by a 470 pF capacitor to ground, which eliminates noise and prevents false strobes.

D.2 RS-232C Interface

Interface Signals

The pins of the printer's RS-232C interface connector carry the signals listed in Table 3. Asterisks in the table indicate signals that are active low. The table also indicates whether each signal is incoming or outgoing with respect to the printer.

Pin	In/out	Description
2	Out	Transmit Data
3	In	Receive Data
4	Out	Request To Send*
5	In	Ignored
6	In	Ignored
7	--	Ground
20	Out	Data Terminal Ready

Table 3 RS-232C Signal Pin Assignments

Brief descriptions of the signals follow.

Transmit Data (Pin 2)

This output carries asynchronous data sent by the printer to the computer. It is used mainly in handshaking protocols.

Receive Data (Pin 3)

This input carries serial asynchronous data sent by the computer to the printer.

Request To Send* (Pin 4)

This output is always held high (above 3 volts).

Clear To Send (Pin 5)

This signal is ignored by the printer.

Data Set Ready (Pin 6)

This signal is ignored by the printer.

Data Carrier Detect (Pin 8)

This signal is ignored by the printer.

Data Terminal Ready (Pin 20)

This output is used as a buffer nearly-full handshake line. It is held high (above 3 volts) when the buffer can accept more data.

RS-232C Theory of Operation

Transmit and receive data are sent and received one bit at a time via a standard AMI 6551 asynchronous communications interface adapter (ACIA) on the printer's main logic board. Standard asynchronous data transmission is used, with the XON/XOFF, ETX/ACK, or DTR protocol, or with all three protocols. See Section D.3 below.

RS-232C Connector

The connector marked **RS-232C** on the rear panel is a DB-25S. The mating connector on the cable should be a DB-25P or equivalent.

RS-232C Interface Voltage Levels

The voltage levels of the interface signals conform to EIA RS-232C specifications. False is from 3 volts to 15 volts. True is from -3 volts to -15 volts. Voltages between -3 volts and 3 volts are undefined.

D.3 RS-232C Protocols

A protocol is a set of rules the computer follows in sending data to the printer. The RS-232C parameters are stored in battery backed-up memory. They are indicated on the status printout. They can be changed by the FRPO (firmware reprogram) command described in the Programming Manual. The parameters and their identification codes are given below.

H1: Baud rate

Parameter value	3	6	12	24	48	96	19
Baud rate	300	600	1200	2400	4800	9600	19200

The factory setting is 9600 baud (96 on the status printout).

H2: Data bits

7 or 8, factory-set to 8.

H3: Stop bits

1 or 2, factory-set to 1.

H4: Parity

Parameter value	0	1	2	3	4
Meaning	None	Odd	Even	Mark	Space

The factory setting is "None" (0 on the status printout).

H5: Protocol logic

Parameter value	Meaning
0	Combination of 1, 3, and 4 below
1	DTR, positive logic
2	DTR, negative logic
3	XON/XOFF
4	ETX/ACK

The factory setting is 0, giving all three protocols simultaneously.

H6: Buffer nearly-full threshold

This is a percentage from 0 to 99. The factory setting is 90.

H7: Buffer nearly-empty threshold

This is a percentage from 0 to 99. The factory setting is 70.

The factory settings of the buffer nearly-full and nearly-empty thresholds (H6 and H7) are subject to change without notification.

The gap between the nearly-full and nearly-empty thresholds allows the computer to send a fairly large amount of data in a continuous stream.

H8: Received-data buffer size

This is the size of the input buffer, specified in units of 10K bytes. The factory-set value is 6 meaning 60K bytes.

APPENDIX E

RS-232C CABLE CONNECTION

This appendix explains the procedure for connecting the laser printer to a computer by an RS-232C cable, setting up the RS-232C interface, and checking that the computer and printer can communicate.

Preparing an RS-232C Cable

After obtaining an RS-232C cable, check that it is wired correctly, referring to the pin assignment table in Appendix D. If you have an IBM communication adapter cable type 1502067, you will have to resolder the wiring at the printer end of the cable. The procedure is as follows.

1. Unscrew the plastic cover from the printer end of the cable.
2. Next to each of the wires inside the cable is a bare shield wire. Solder all these shield wires together into a single bundle.
3. Using a section of flat wire about 3 mm wide and 15 mm long, connect the bundle of shield wires to the metal facing of the connector. Check that the solder connections are secure.
4. Desolder wires 2 and 3, then resolder them in crossed configuration. Solder wire 2 to pin 3 and wire 3 to pin 2. Cover the solder joints with thermofit tube.
5. Cut wires 4, 5, 6, and 20.
6. Solder wires 5 and 6 together and connect them to pin 20. Cover the solder joints with thermofit tube. Leave wire 4 unconnected.

7. Tape all remaining loose ends, or seal them with thermofit tube.
8. Screw the plastic cover back on.

Connecting the Printer to the Computer

1. Check that the power of both the printer and computer is switched off.
2. Place the plastic cap over the printer's parallel interface connector.
3. Plug the printer end of the RS-232C interface cable into the printer's RS-232C connector and screw it in place.
4. Plug the other end of the cable into the computer's RS-232C interface connector.
5. Switch on the printer's power. The printer will automatically sense that the cable is plugged in and operate on the RS-232C interface. (The parallel connector must not be plugged in.)
6. The printer's RS-232C parameters are factory-set to the following values:

Baud rate	9600 bps
Character length	8 bits
Stop bit	1
Parity check	None
Protocols	All three

The three RS-232C protocols are XON/XOFF, DTR, and ETX/ACK. The printer performs all three of them simultaneously, using positive logic for DTR.

If you are uncertain as to the printer's current parameter settings, you can reset them to the values listed above by pressing the MANUAL FEED key on the control panel, holding it down, then also pressing the ON LINE key.

7. Set the computer to the same parameters as the printer. On many computers this can be done by setting DIP switches before power is turned on. Two other methods are as follows:

   In MS-DOS enter the following commands:

```
A>MODE COM1:96,N,8,1,P
A>MODE LPT1:=COM1
```

   To test the interface, then enter:

```
CTRL P
A>DIR
CTRL P
```

   After about fifteen seconds, the printer should print out the directory of your MS-DOS disk.

   In Microsoft BASIC, run the following program:

```
10 OPEN "COM1:9600,N,8,1,CS1000,DS1000,LF" AS #1
20 PRINT #1, "RS-232C INTERFACE TEST"
30 PRINT #1, "   TEST SUCCESSFUL"
40 PRINT #1, CHR$(12)
50 CLOSE
60 END
```

   If you obtain the printout shown below, the interface is correctly set up.

```
RS-232C INTERFACE TEST
   TEST SUCCESSFUL
```

The software settings made by the procedures above are temporary. On most computers, permanent settings must be made with the DIP switches.

If you want to use a different baud rate or change any of the other RS-232C parameters, you can use the printer's FRPO (firmware reprogram) command. See the Programming Manual for details.

APPENDIX F

GLOSSARY

A4 size: 21 x 29.7 centimeters

B5 size: 18.2 x 25.7 centimeters

Centronics interface: A standard parallel interface often used to connect computers and printers.

Corona discharge: A weak in-air electric discharge.

Developer kit: A maintenance kit containing a new developer unit and a transfer charger.

Developer unit: The entire unit located in the hopper, that holds toner from the toner cartridge and transfers it to the drum with a magnetic roller.

Drum: A cylinder made of a material that conducts electricity when illuminated by light.

Drum cartridge: A unit located inside the front door, containing the drum, main charger, and a cleaning system.

Drum kit: A maintenance kit containing a new drum cartridge, a TF cleaner, and a wiper.

Emulate: Operate in the same way as another device. The laser printer emulates other printers by imitating their responses to control codes and escape sequences.

Face-down unit: The unit that feeds printed pages out face-down on top of the printer.

Fuser: A mechanism consisting of a heat roller and pressure roller, that fuses the toner to the paper just before it leaves the lower main unit.

Fuser heat roller: The upper roller in the fuser unit.

Hopper: The receptacle for the developer unit and toner cartridge, located on top of the printer.

Interface cable: The cable connecting the printer to the computer.

Interlock: A switch that prevents the printer from operating when it is not properly closed. The laser printer has interlock switches for its main unit, face-down unit, and hopper.

Isolation transformer: A device that can be used to isolate the printer from noise on the power line.

Laser: A device that emits a beam of coherent light, in which the lightwaves are all in step. Such a beam can be sharply focused.

Legal size: 8.5 x 14 inches

Letter size: 8.5 x 11 inches

Main charger: A unit inside the drum cartridge, that discharges electricity onto the surface of the drum.

Main logic board: The printed circuit board on which the printer's memory and logic control circuits are mounted.

Off-line: The state in which the printer does not print the data it receives.

On-line: The state in which the printer prints the data it receives.

Optical filter: A narrow window, located above and parallel to the drum cartridge, that filters the laser light reaching the drum.

Paper chute: The metal slot attached to the transfer charger, that guides paper to it.

Paper tray: The tray that receives the printed pages.

Parallel interface: An interface over which data are transmitted eight bits at a time.

Permanent memory: Memory that is backed up by an internal battery, so its contents are not lost when power is switched off.

Ramp: The metal plate located in the lower unit between the transfer charger and fuser.

RS-232C interface: A standard serial interface.

Serial interface: An interface over which data are transmitted one bit at a time.

Status information: A page of information obtained by pressing the printer's STATUS key, indicating:

- The software version number and release date
- Units and margins
- Line and character spacing
- Memory usage
- Parameter values held in permanent memory
- Font numbers and sizes in memory

Toner: A kind of powdered ink.

Toner kit: A maintenance kit containing a new toner cartridge, waste toner bottle and cap, and fuser cleaning pad.

Transfer charger: The trough-shaped unit located in the lower main unit, directly under the drum, that charges the paper electrically to transfer toner to it.

INDEX

A

A4 C-5
Adhesive-backed labels C-8
Ambient conditions B-2

B

B5 B-2

C

Cartridge stopper 1-24,3-9
Cassette 1-3,1-5,1-23,B-2
Cassette cover 1-5
Character length 2-5
Cleaner knob 3-4
Cleaning tool 3-4
Clearance 1-10
Colored paper C-8
Connectors 1-27,3-18 to 3-21
Control panel 2-2
Corona discharge A-2,A-3,F-2
Counter 1-3

D

Developer B-2
Developer handle 1-6,3-20
Developer kit 2-4,3-1,3-18
Developer stoppers 3-18
Developer unit 1-6,3-3,F-2
Drum A-2,B-2,F-2
Drum cartridge 1-8,3-15,F-2
Drum kit 3-4,F-2
Drum cartridge cover 1-18
Drum cartridge lock lever 1-8,3-12
Drum cartridge spacer 1-18
Drum cleaning B-2
Drum cartridge spacer 1-18
Drum cleaning B-2
Drum discharging B-2
Dust cover 1-31

E

Emulation mode 2-13
Envelopes C-8

F

Face-down cover 4-14
Face-down unit 1-2,F-2
FF key 2-5,2-8
Front door 1-3,1-20,3-12
FRPO 1-31
Fuser 1-7,2-4,A-3,F-2
Fuser cleaning pad 1-13,3-8,3-24
Fuser spacers 1-17
Fuser unit 1-7,3-1,4-7

H

Heat roller A-3,F-2
Hopper cover 1-3,2-4
Host computer interface D-1
Humidity 1-10

I

IC card 2-12,2-17
IC card slots 1-3
Indicators 2-3
Interface problems 4-4
Interlock switch 1-7
Isolation transformer 1-11,F-3

L

LED array A-3
Legal size F-3
Letter size F-3
Linefeed action 1-31
Lower unit 1-2

M

Magnetic roller A-2
Main charger B-2,F-2
Main charger wire A-2
Main charger wire cleaner 1-8
Main logic board D-7,F-3
Main switch 1-3,2-6
Maintenance kits 3-2
MANUAL FEED key 2-5,2-9
Manual feed tray 1-5,1-22
Manual paper feeding 2-14
Moving the printer 1-33

N

Noise filter 1-11

O

Off-line 2-5,F-3
On-line 2-3,F-3
ON LINE indicator 2-2
Optical filter 3-15,F-3
Overhead projection (OHP) film C-8

P

Page formatting 2-13
Paper chute 1-7,3-14,F-3
Paper guides 1-5,2-14
Paper indicator 2-2,4-12
Paper jam 4-14,C-4
Paper jam indicator 2-2,4-14
Paper size C-4
Paper specifications C-3
Parallel interface D-2,F-4
Parallel interface connector 1-4
Polygon scanner A-3
Power cord 1-13,1-27
Power cord receptacle 1-4
Power problems 4-3
Power requirements 1-9
Preprinted paper C-8
Pressure roller A-3
Print quality problems 4-5
Prolonged non-use 1-32

R

Ramp 1-7,F-4
Ready indicator 2-2,4-12
Release lever 1-3
Repacking 1-14
Resolution B-2
RS-232C cable connection E-1
RS-232C connector 1-4
RS-232C parameters 2-5

S

Sealing strip 1-25,3-10,3-22
Self test B-2
Serial interface 1-27,F-4
Setup and interfacing 1-15
Specifications B-1
Status print 2-10
Status switch F-4
Switching power on 2-6

T

Temperature 1-10
TF cleaner 3-14,3-15,4-6
Toner 1-6,A-2,F-4
Toner cartridge 1-6,1-13,1-24
Toner indicator 2-4
Toner kit 1-14,3-3,F-4
Toner kit replacement 3-5
Transfer charger 1-7,3-14,F-4
Troubleshooting 4-1

U

Unpacking 1-12
Upper unit 1-16

V

Voltage regulator 1-11

W

Waste toner bottle 1-7,3-24
Waste toner bottle cap 1-13

INDEX